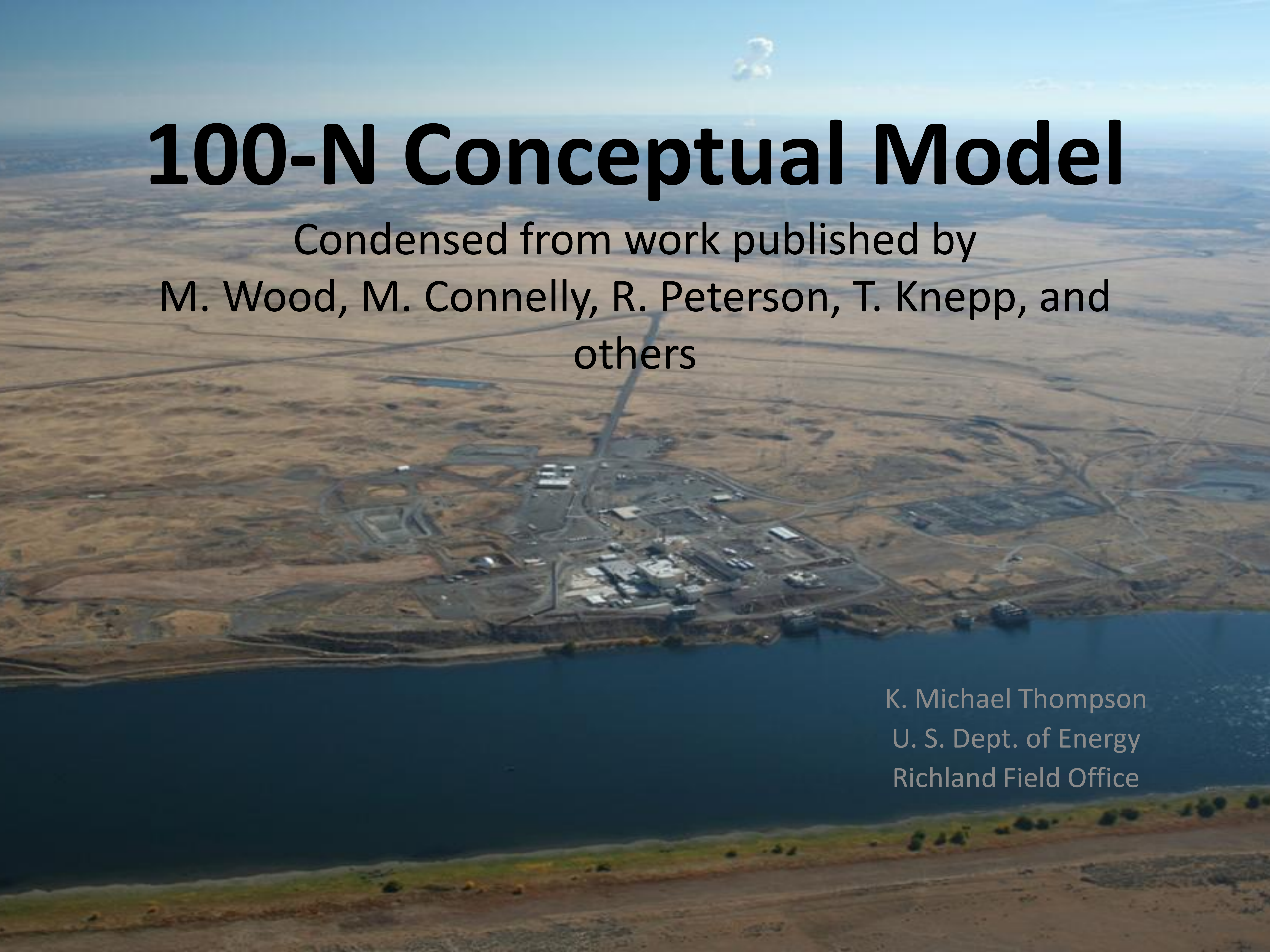


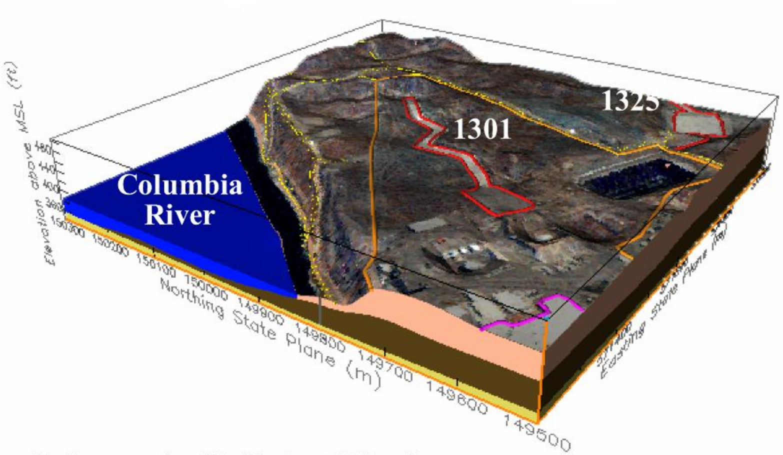
100-N Conceptual Model

Condensed from work published by
M. Wood, M. Connelly, R. Peterson, T. Knepp, and
others

K. Michael Thompson
U. S. Dept. of Energy
Richland Field Office

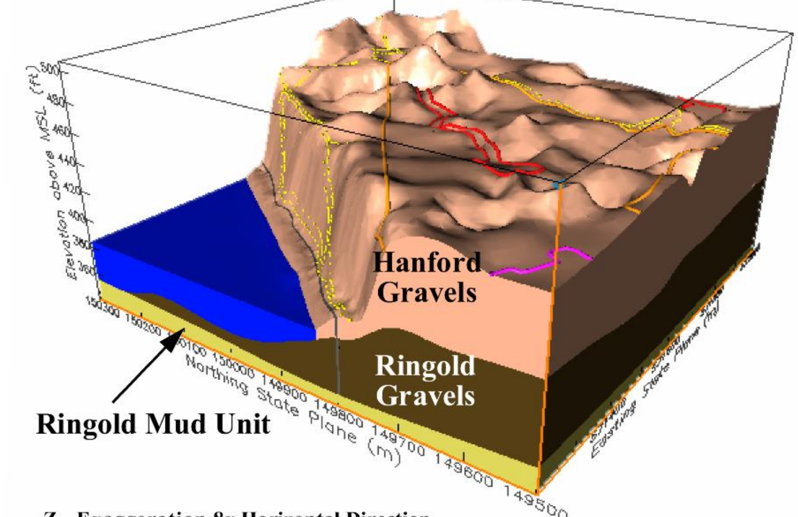
Geology of the 100-N Area

100 N Area Perspective View Showing the Location of N Reactor and the1301-N and 1325-N LWDFs



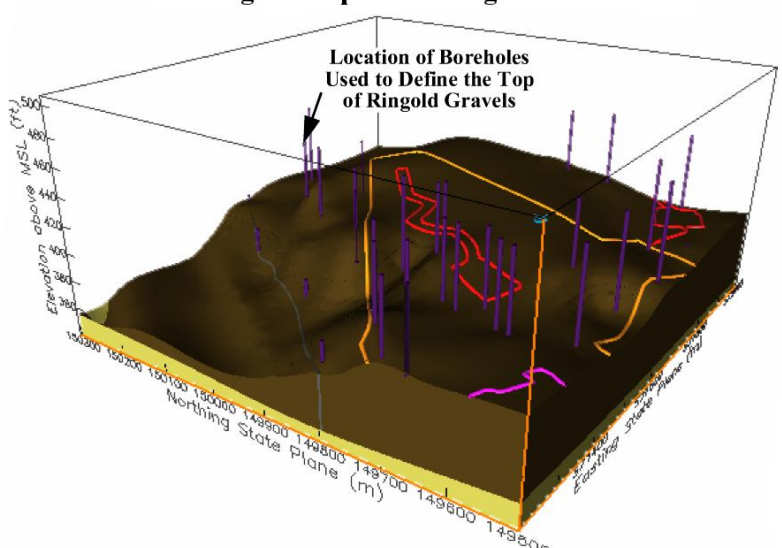
Z Exaggeration 27 x Horizontal Direction

Block Diagram with the Major Lithologic Formations in the 100 N Area



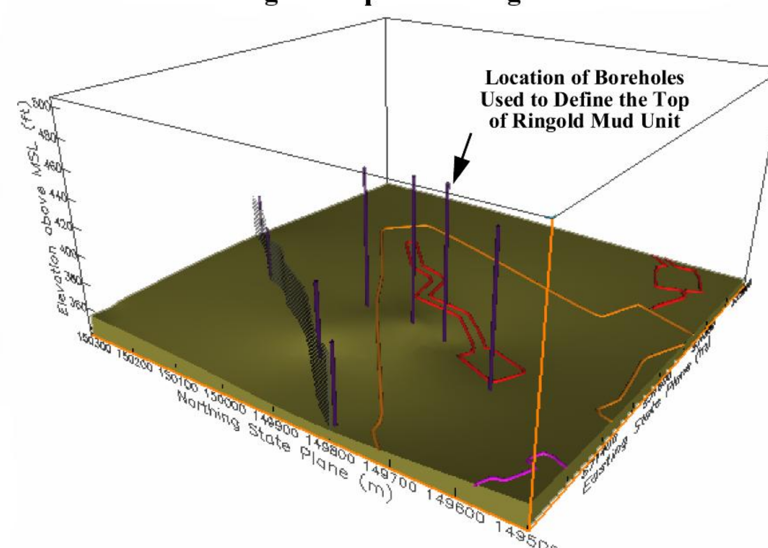
Z Exaggeration 8x Horizontal Direction

Hanford Gravels Have Been Removed Revealing the Top of the Ringold Gravels



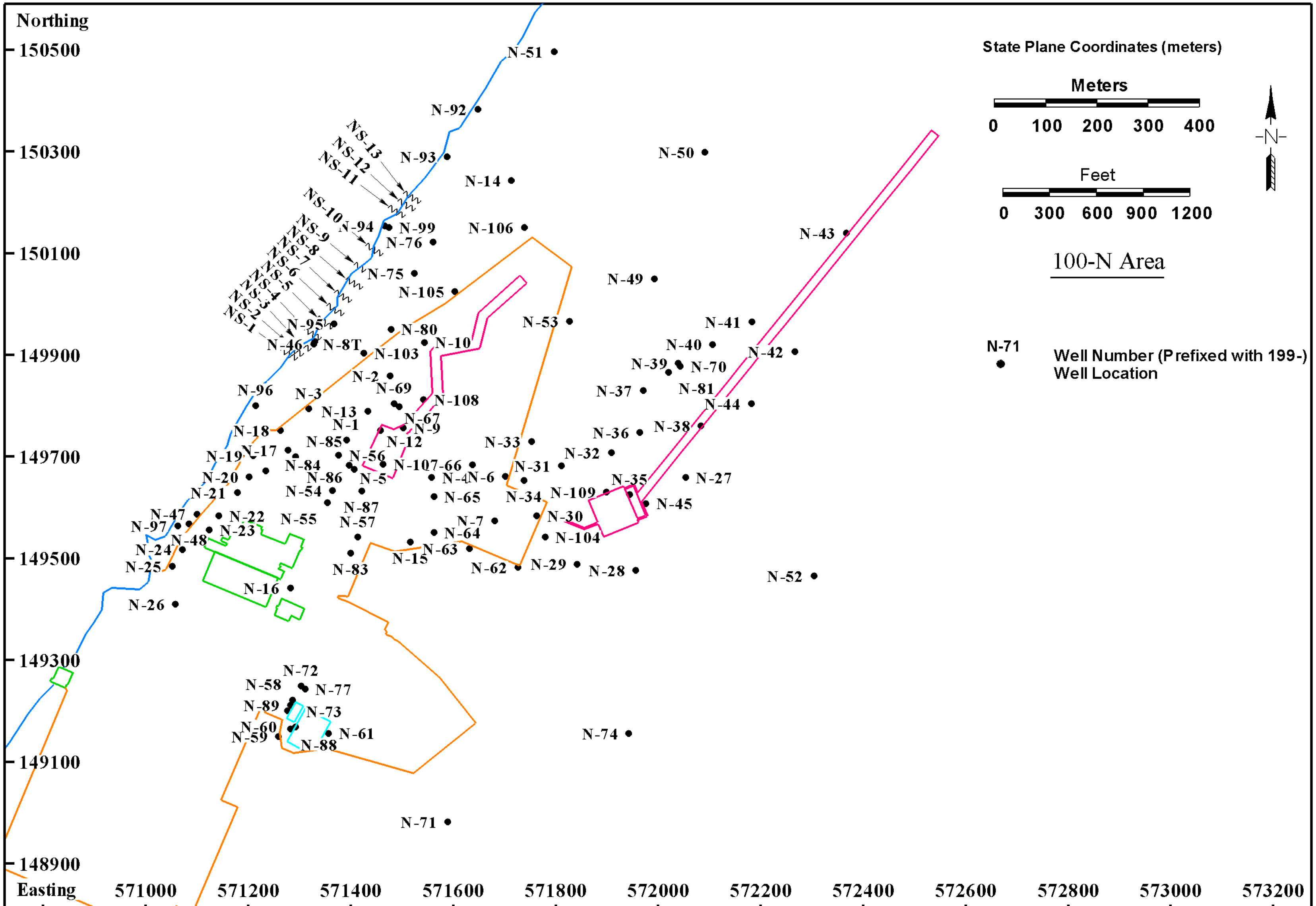
Z Exaggeration 8x Horizontal Direction

Hanford and Ringld Gravels Have Been Removed Revealing the Top of the Ringold Mud

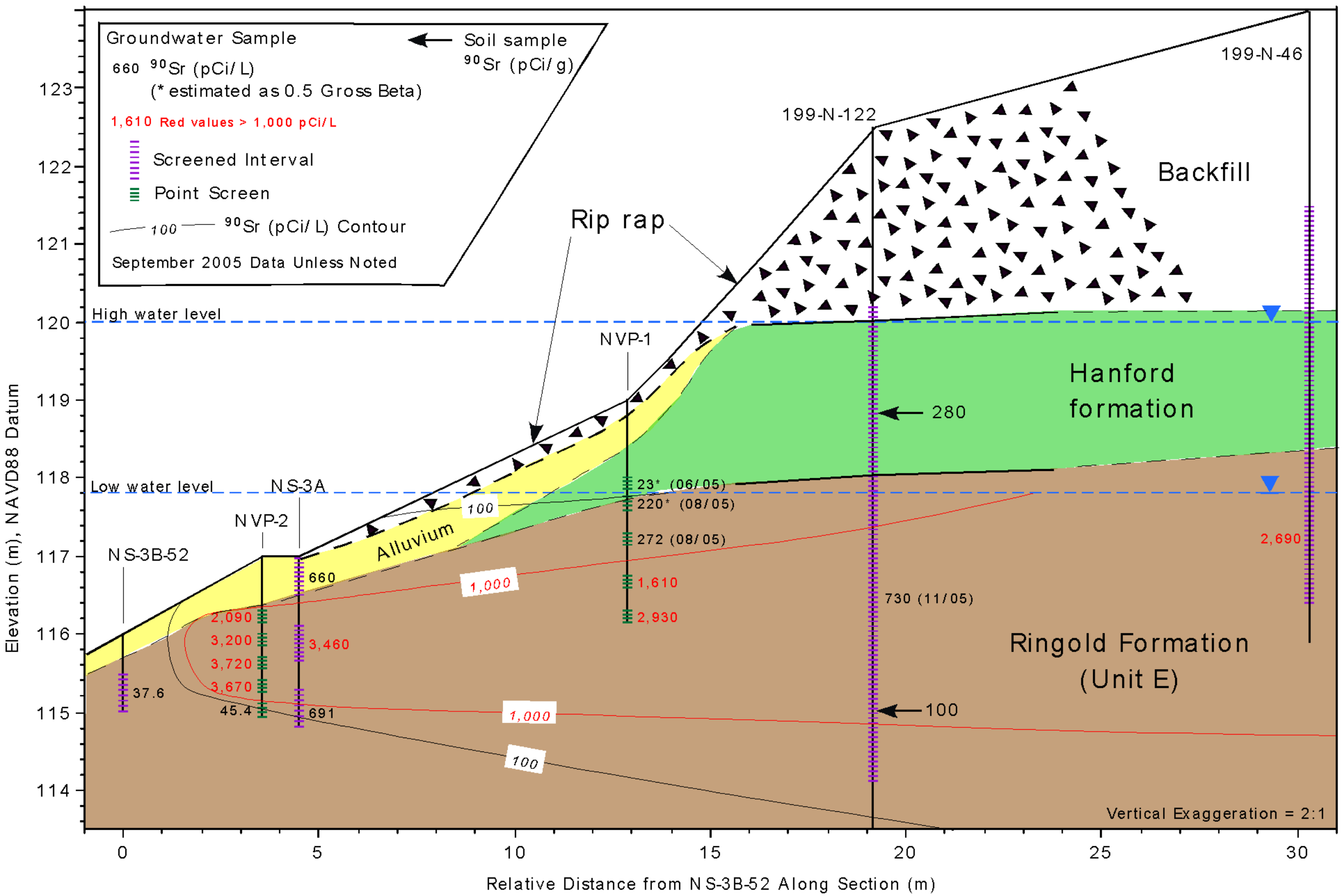


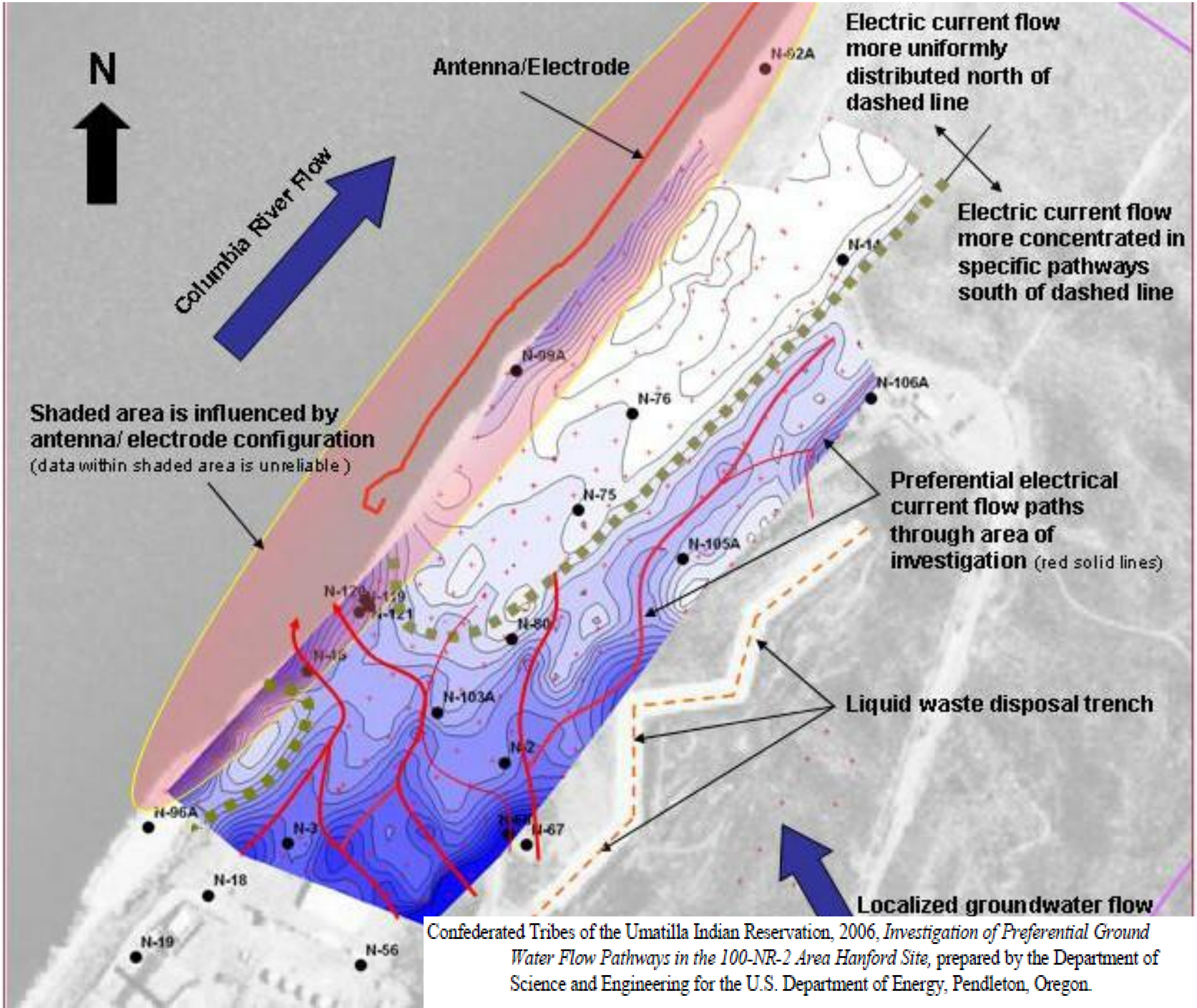
Z Exaggeration 8x Horizontal Direction

100-N Monitoring Well Network



Hydrogeologic Cross Section and Contaminant Distribution within the Stronium-90 Plume at the 100-N Area

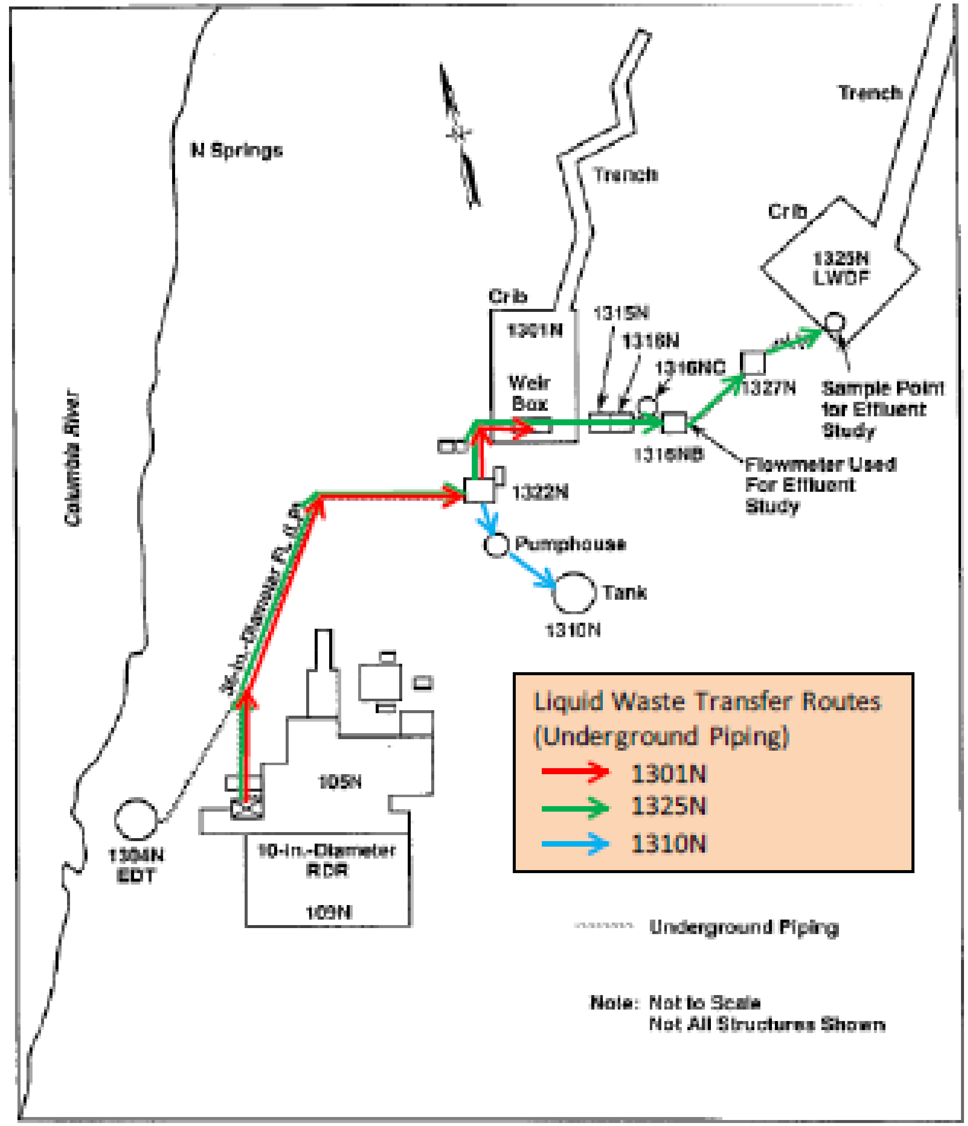




Confederated Tribes of the Umatilla Indian Reservation, 2006, *Investigation of Preferential Ground Water Flow Pathways in the 100-NR-2 Area Hanford Site,* prepared by the Department of Science and Engineering for the U.S. Department of Energy, Pendleton, Oregon.

100-N Contaminant Release

- Nearly all significant contaminant release was to LWDF's 1301-N & 1325-N
  - Spent fuel storage basin overflow
  - Primary reactor loop coolant bleed-off
  - Reactor decontaminant rinse solutions
  - Reactor drains
  - Sodium dichromate (1301-N only; ceased in 1973
- 1310-N
  - High-contamination fluids trucked to 200 Area for disposal



100-N High Priority Waste Sites*
1301-N
1314-N Liquid Waste Loadout Facility*
1322-N
12" RDR
36" CD
118-N-1 Spacer Storage Silo*
24" FL(LP)
36" CD
Lift Station
105-N Spent Fuel Pool*
10"
36" Drain
1304-N Emergency Dump Tank*
1300-N-E Emergency Dump Basin*

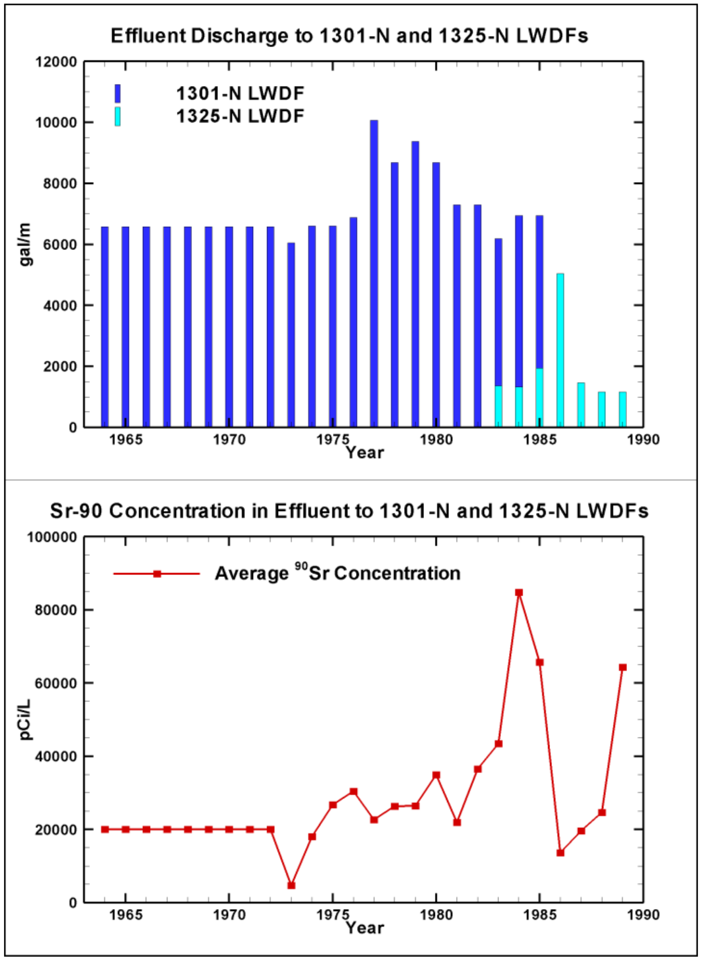
Other Potential Contaminant Release Sites

- **1310-N (116 N-2) Radioactive chemical waste treatment & storage Facility**
- **1304-N Emergency Dump Tank & 1300-N (116-N-4 Emergency Dump Basin for primary loop reactor cooling water**
- **118-N-1 Fuel Spacer Storage Silos (2 small unplanned releases reactor water)**
- **105-N Spent Fuel Storage Basin**
- **116-N Tank Farm (Petroleum spill – Largest, 80,000 gallons Diesel oil spilled in 1966)**
- **1324-N (120-N-1) Percolation Pond-treated corrosive regeneration effluent, process & cooling water from demineralization plant**
- **1324-NA (120-N-2) Surface Impoundment- double-lined impoundment with leak detection – used to neutralize acid & caustic regeneration effluent from demineralization plant**
- **Unknown source(s) of Nitrate – Possible use of nitric acids in facilities, unknown inventory**

What is a picoCurie ?

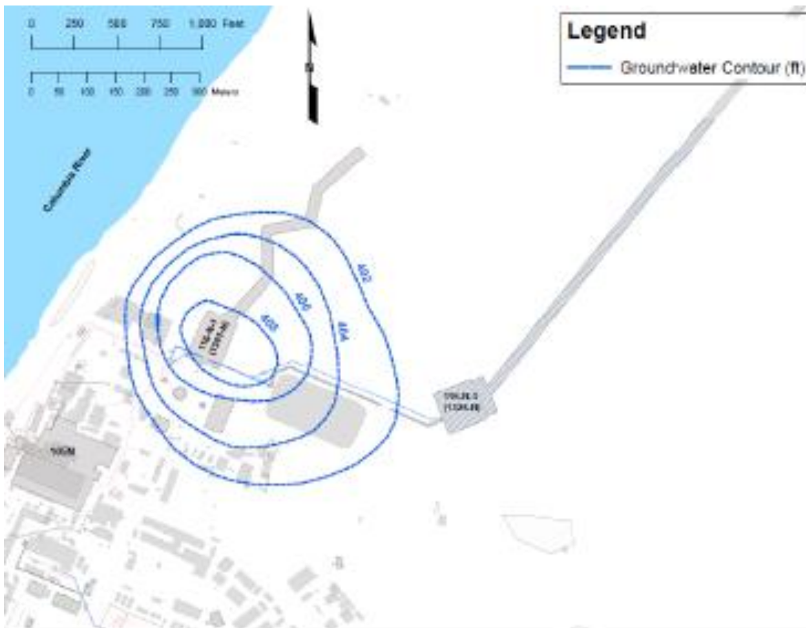
- 1 Curie (Ci) = That quantity of radioactive material that results in 37 billion disintegrations/second, equivalent to 1 gram radium
- 1 picoCurie = Pico" is a metric prefix that means one one-millionth of one one-millionth = 1/trillianth (10^{-12})of 1 curie
- 1 picoCurie = That quantity of radioactive material that results in 2.2 nuclear disintegrations/minute

100-N Effluent Discharges to LWDF's



- Strontium-90 concentrations at N Springs reaches 5,000 pCi/ liter in 1985
- Strontium-90 groundwater plume concentrations peaked in excess of 45,000 pCi/ liter beneath 1325-N in late 1989
- Strontium-90 groundwater plume persists; max concentration ~ 1,000X MCL

100-N Mounding During Operations



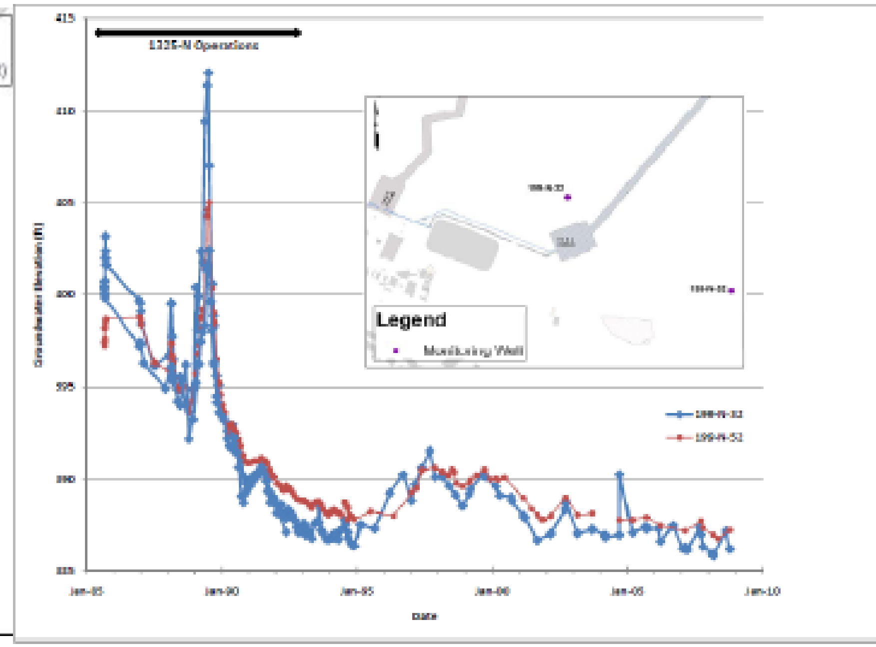
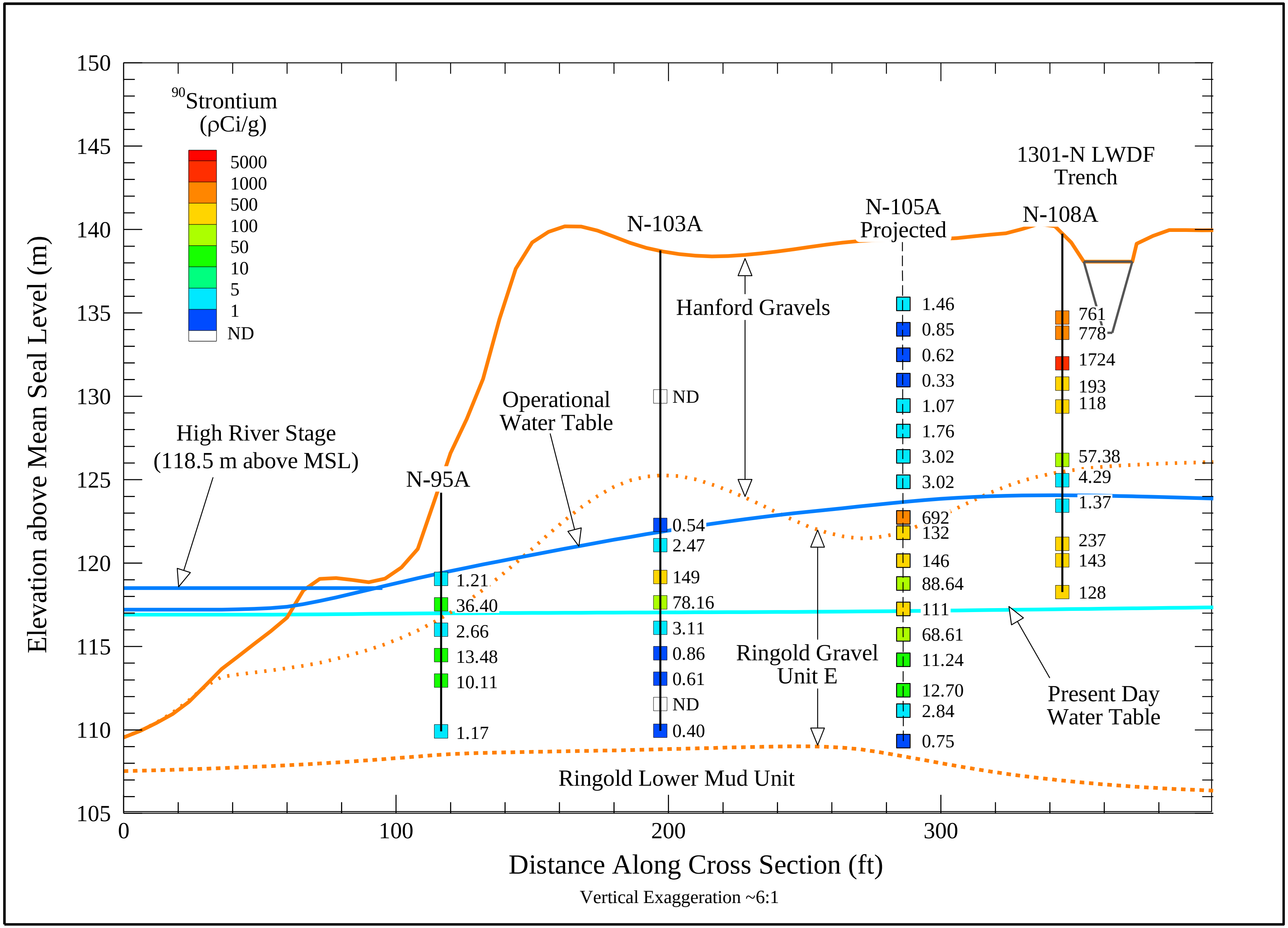
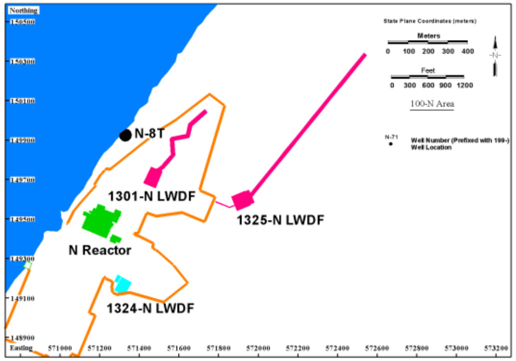


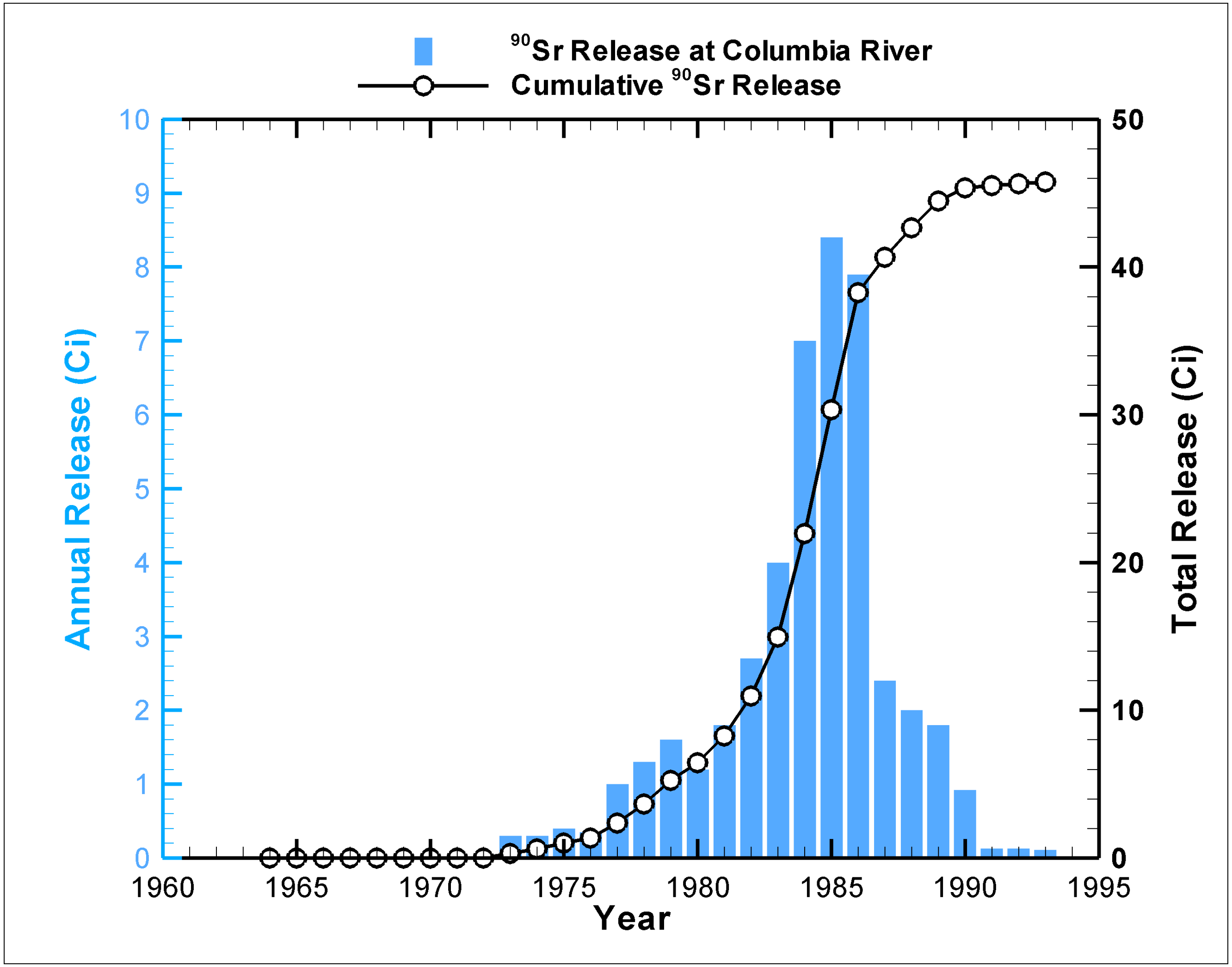
Figure 4-12. Comparison of Water Table Elevations over Time at Groundwater Monitoring Wells near 1325-N Liquid Waste Disposal Facility (Wells 199-N-32 and 199-N-52)

Strontium-90 Soil Sampling Data



Sr-90 Impacts to Columbia River during Operations

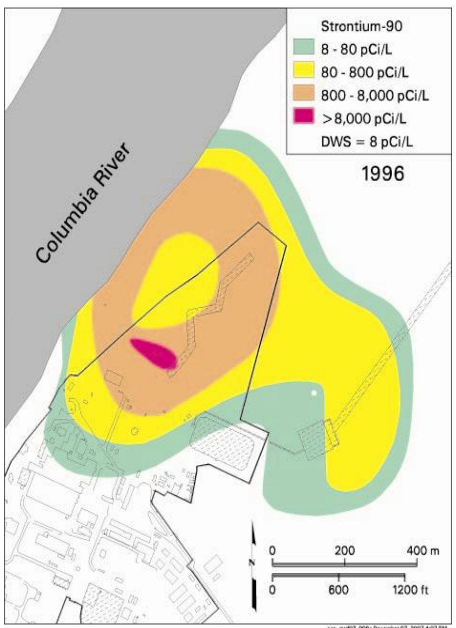


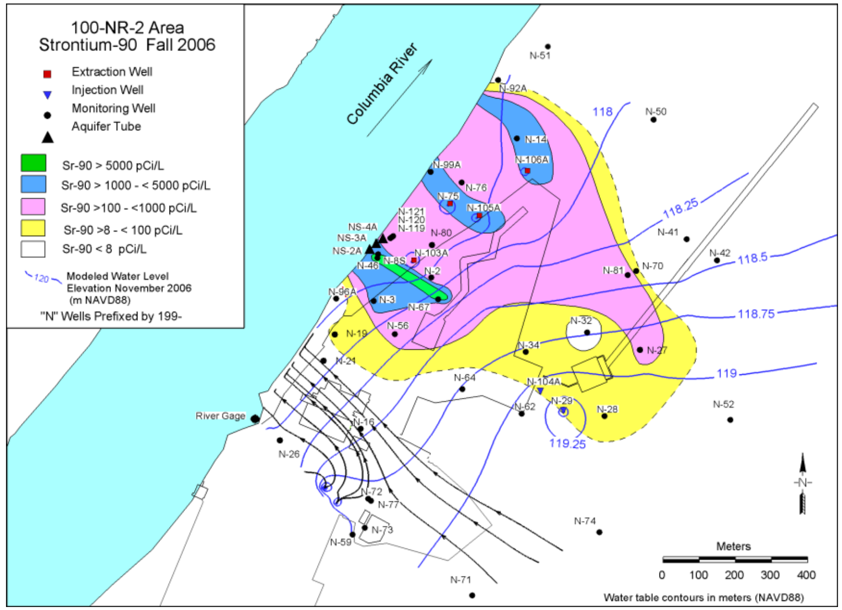


Strontium-90 Plume Maps

Sr-90 plume over time

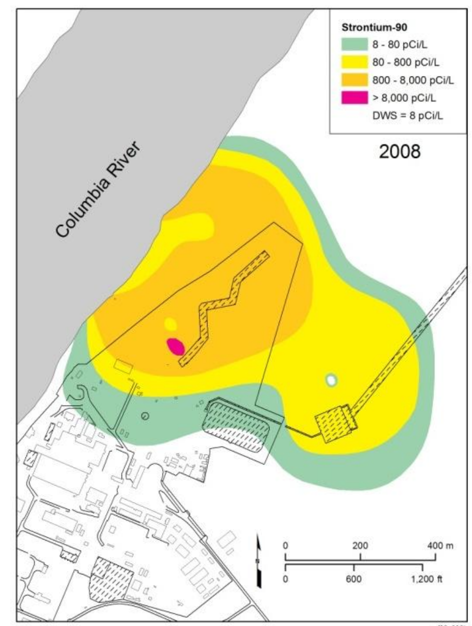
1996





Fall 2006

2008



Very little change over time, especially since P&T placed in cold standby

Radionuclide Inventory 100-N LWDF's (DOE/RL-95-110 Draft A)

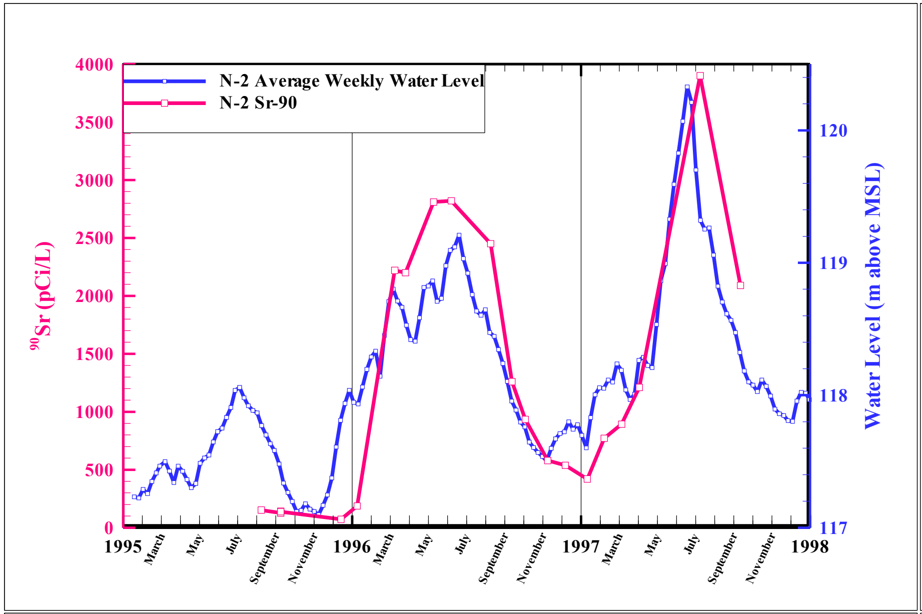
1301-N LWDF

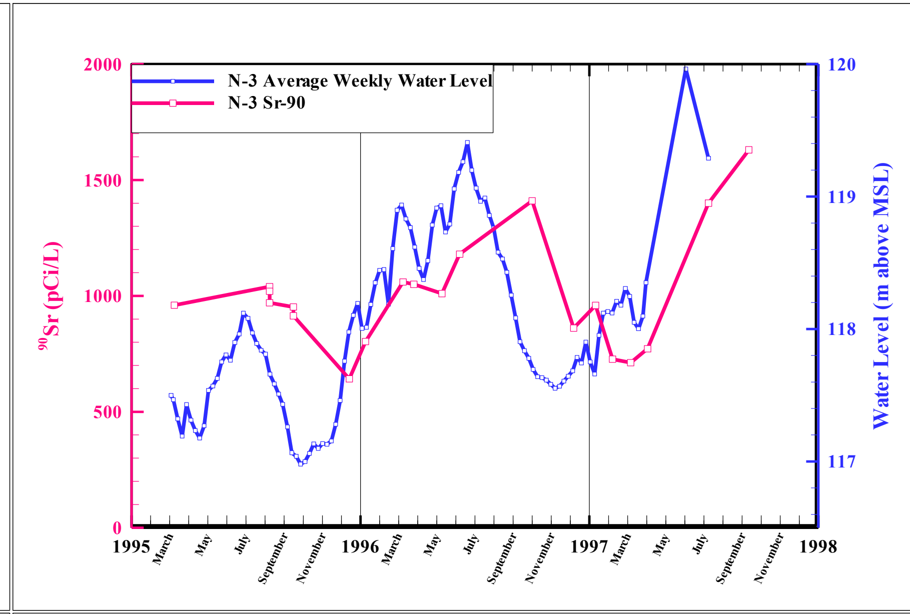
Radionuclide	Half-Life (Yr)	Inventory (Ci) 1995
Tritium	12.7	1803
Cobalt-60	5.2	1095
Strontium-90	29	1630
Ruthenium-106	1	0
Cesium-134	2.1	2
Cesium-137	30.2	1857
Plutonium-239	24,111	18

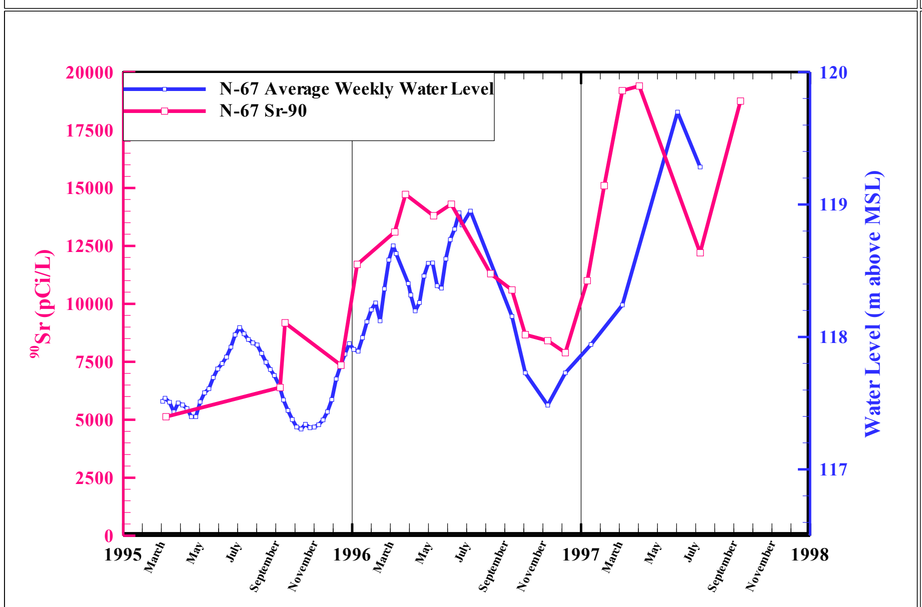
1325-N LWDF

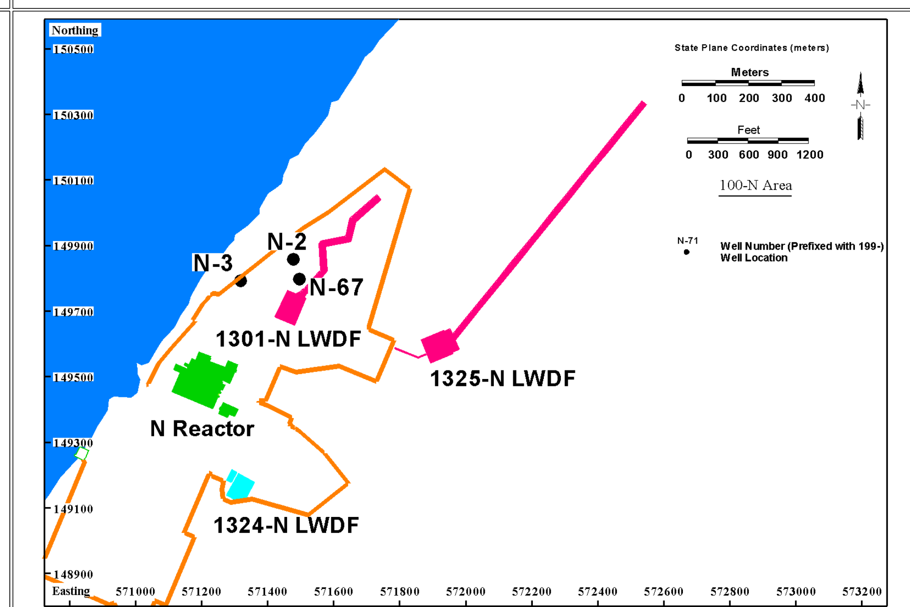
Radionuclide	Half-Life (Yr)	Inventory (Ci) 1995
Tritium	12.7	421
Cobalt-60	5.2	416
Strontium-90	29	236
Ruthenium-106	1	0
Cesium-134	2.1	1
Cesium-137	30.2	391
Plutonium-239	24,111	3

Impacts of Flood Events on Sr-90 in Groundwater

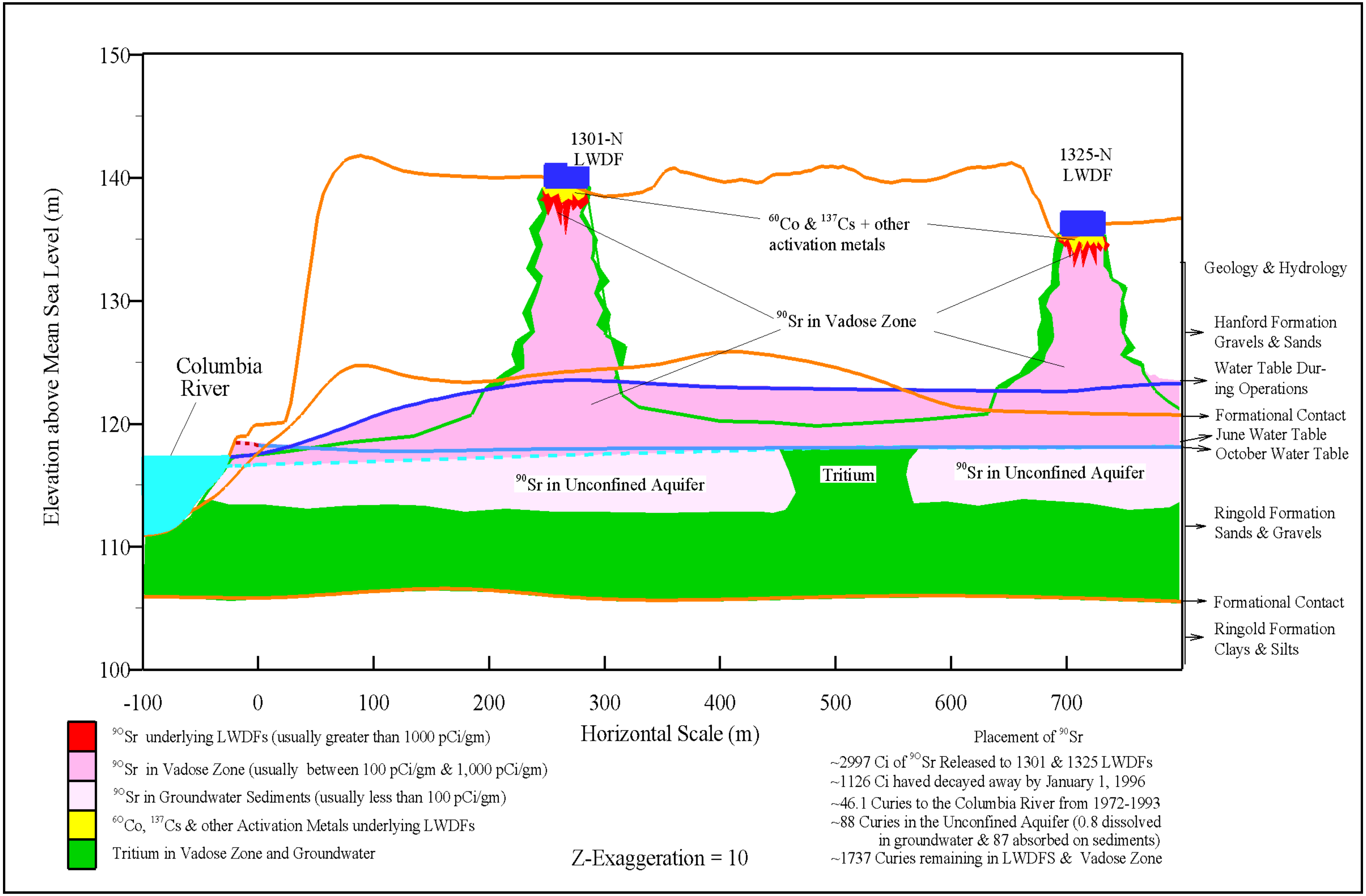








100-N Conceptual Model



Geochemistry of Stontium-90, cont'd

Groundwater Velocity:

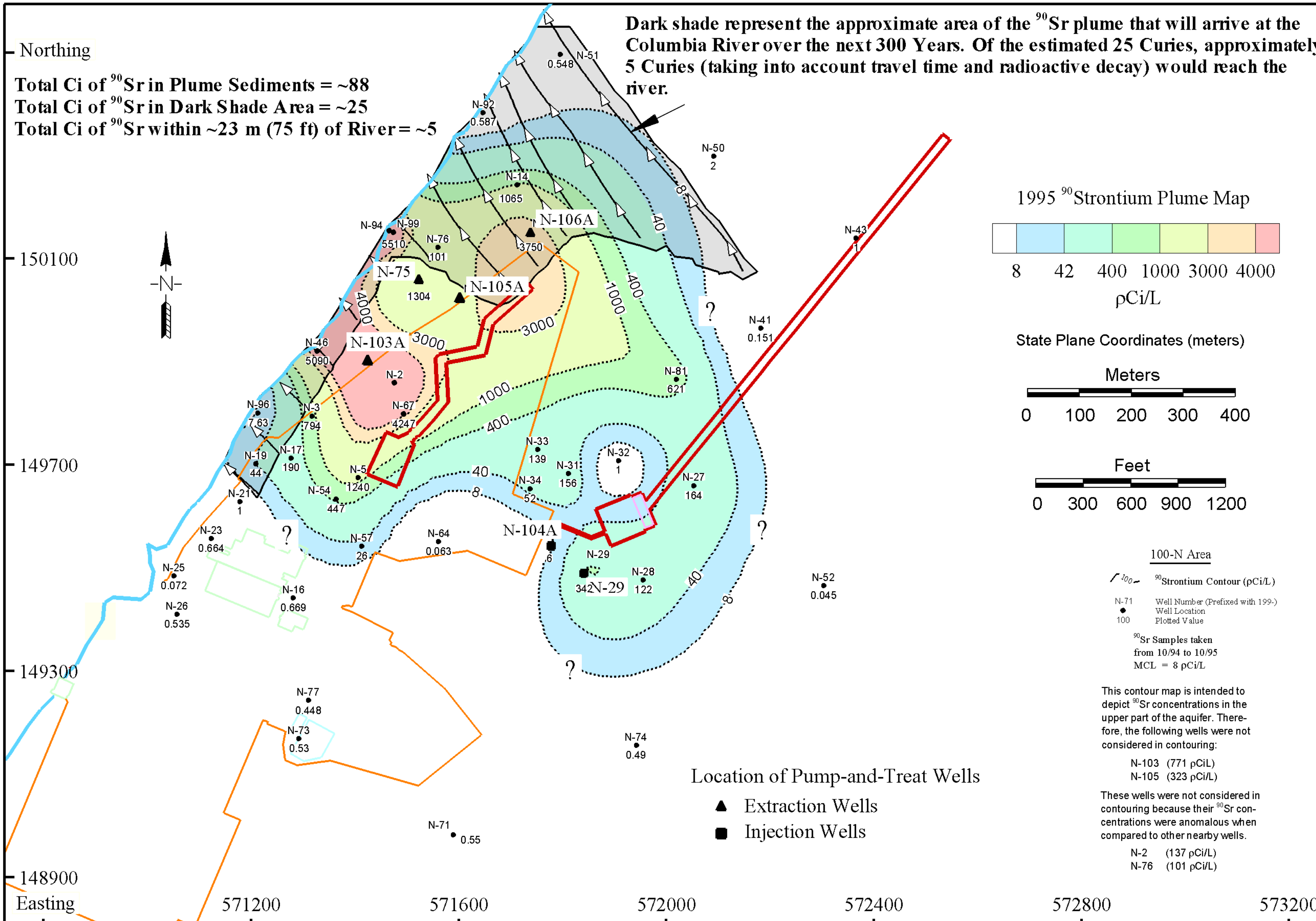
$$\upsilon_{\mathrm{w}} = \frac{-K * dh}{n * dl}$$

Sr-90 Velocity Relative to Groundwater Velocity

$$\frac{\upsilon_{\mathrm{w}}}{\upsilon_{\mathrm{Sr\text{-}90}}} = 1 + \frac{\rho_b}{n} * K_d = 1 + \frac{2.0 g / ml}{0.28} * 15 ml / g = 108$$

υ_w	=	Groundwater Pore Velocity
K	=	Hydraulic Conductivity
n	=	Porosity
dh	=	Change in Water Level
dl	=	Change in Distance over which Water Level Change Took Place
$\upsilon_{Sr\text{-}90}$	=	Sr-90 Velocity in Groundwater
ρ_b	=	Bulk Density
K_d	=	Bulk Distribution Coefficient

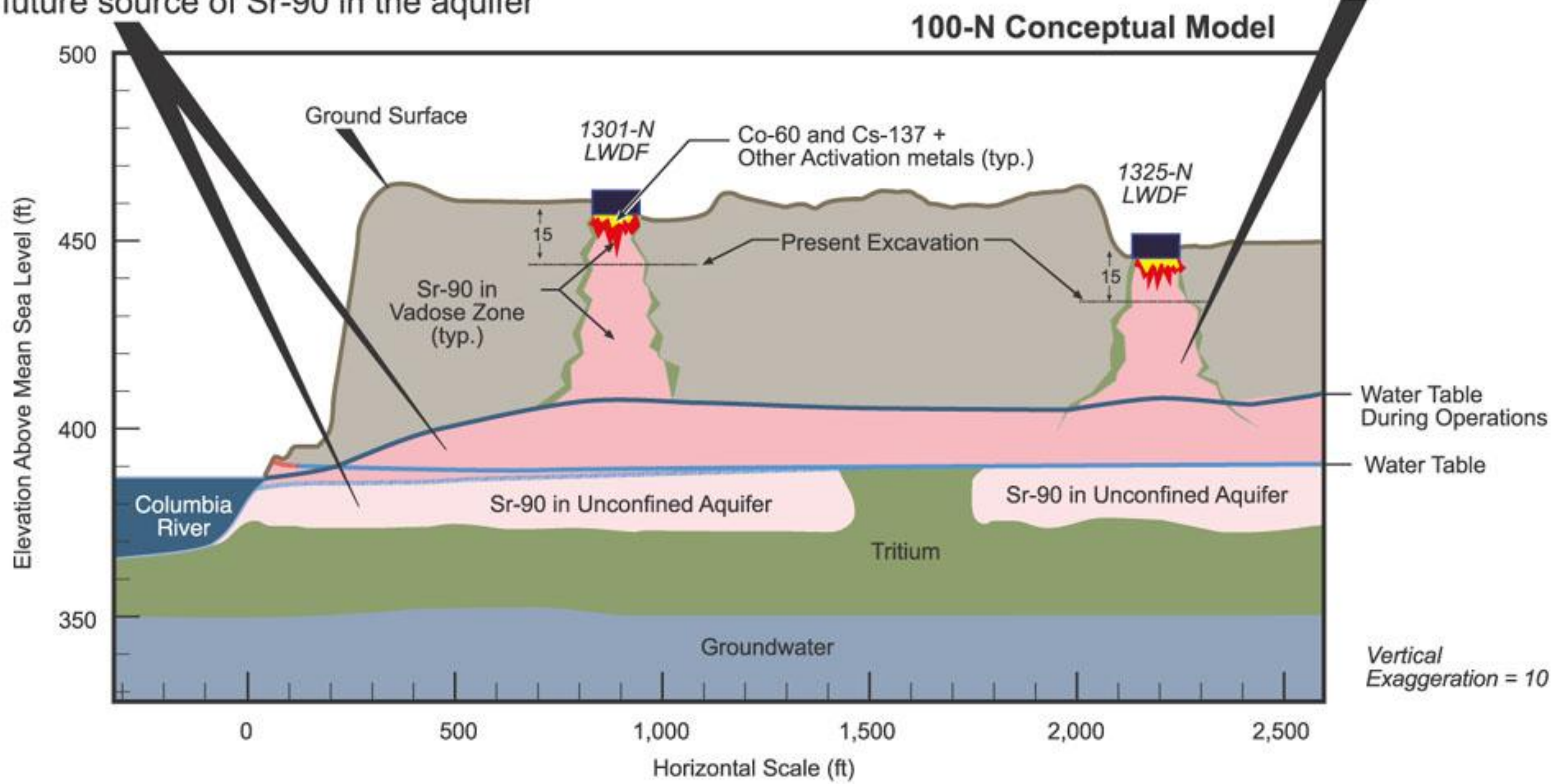
Conceptual Model for 100- N Area cont'd



Further excavation will have no meaningful impact on the Sr-90 groundwater plume, and will not benefit human health or the environment

1301-N and 1325-N Liquid Waste Disposal Facility operations resulted in a "pancake" of Sr-90 contaminated soils and aquifer matrix that runs from the trenches to the Columbia River – this is the current and future source of Sr-90 in the aquifer

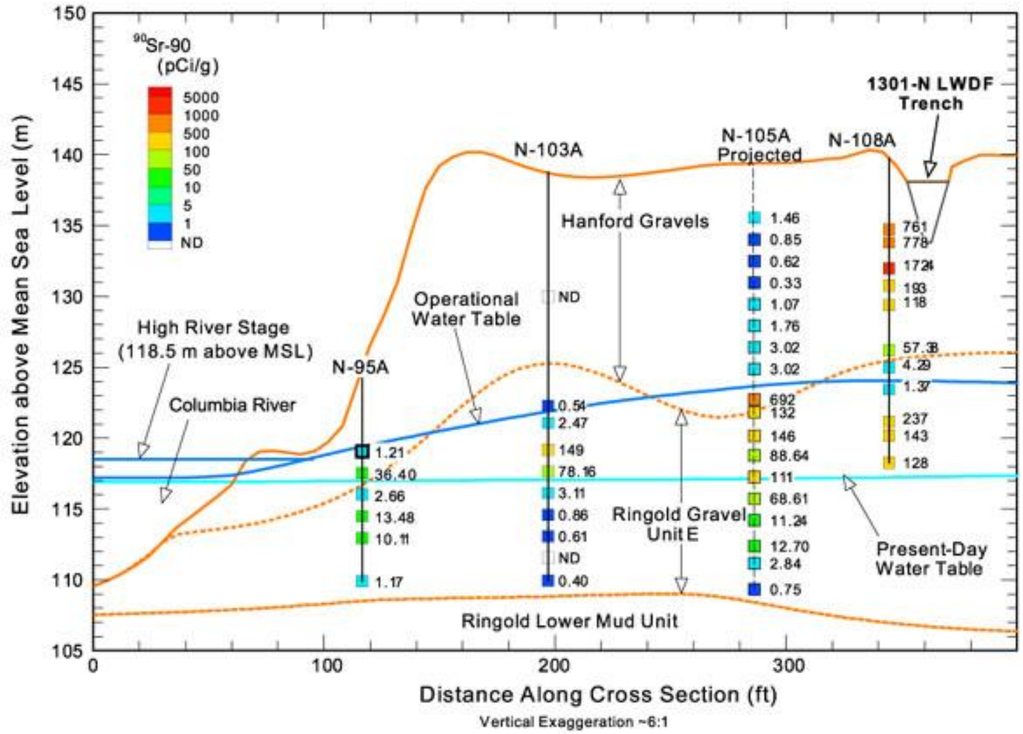
Sr-90 remaining in the vadose zone below the 1301-N and 1325-N Liquid Waste Disposal Facilities is an inconsequential contributor to groundwater contamination



Excavation and removal of all the contaminated soils from the trenches to the river will not result in cleaning up the aquifer

- A concentration of >0.12 pCi/g Sr-90 in the wetted soils of the aquifer will exceed the drinking water standard of 8 pCi/L
- This level is exceeded between the trenches and the Columbia River

Sr-90 Concentration Levels on Soils in Nearby Wells



Geochemistry of Stontium-90

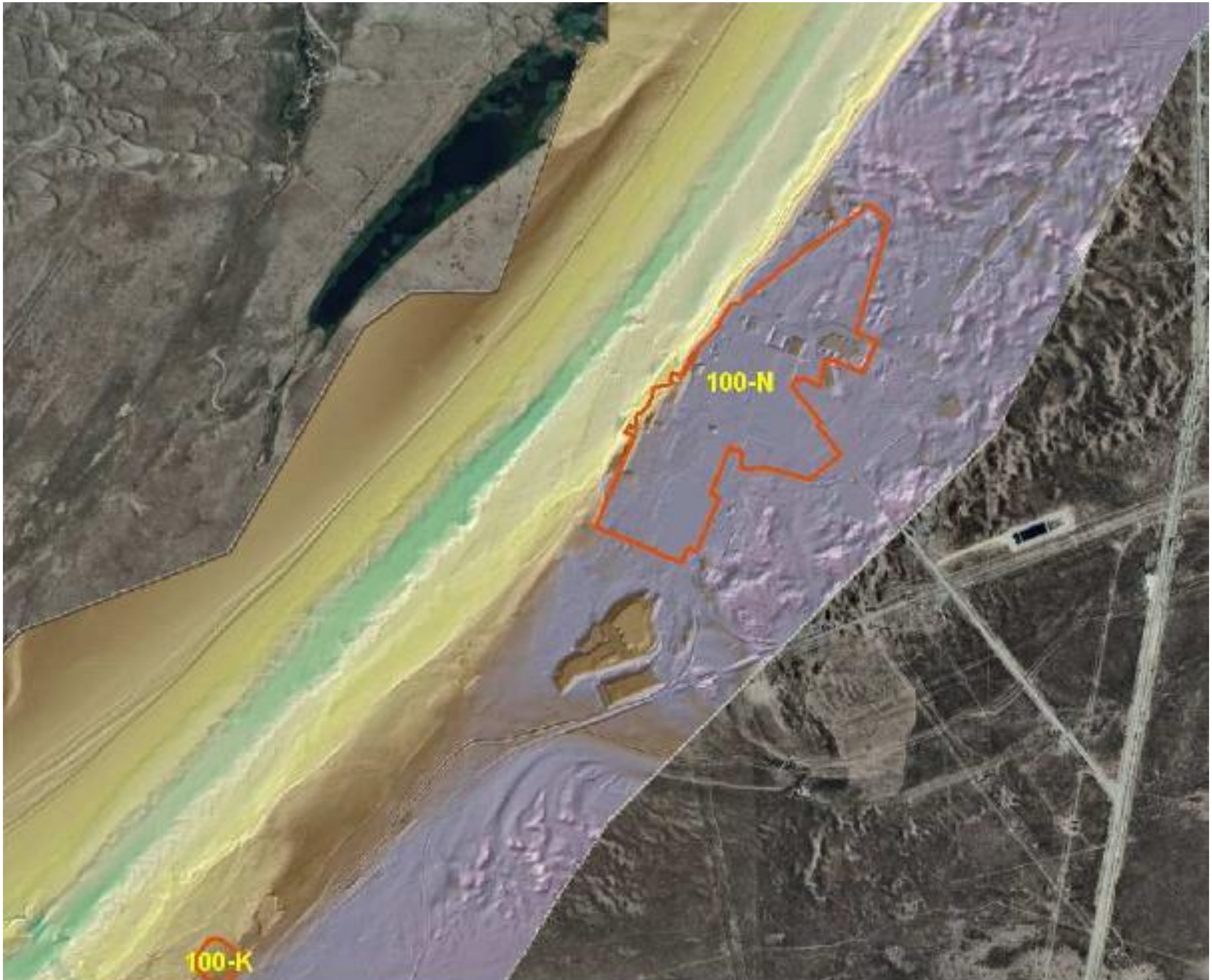
The mobility of Sr-90 is determined by the ability of the different rock types to adsorb the Sr-90 available in the water. This is expressed by a simple ratio known as the bulk distribution coefficient also known as the K_d, which is the ratio of the mass on the solid phase per unit mass of solid phase divided by concentration in the water phase:

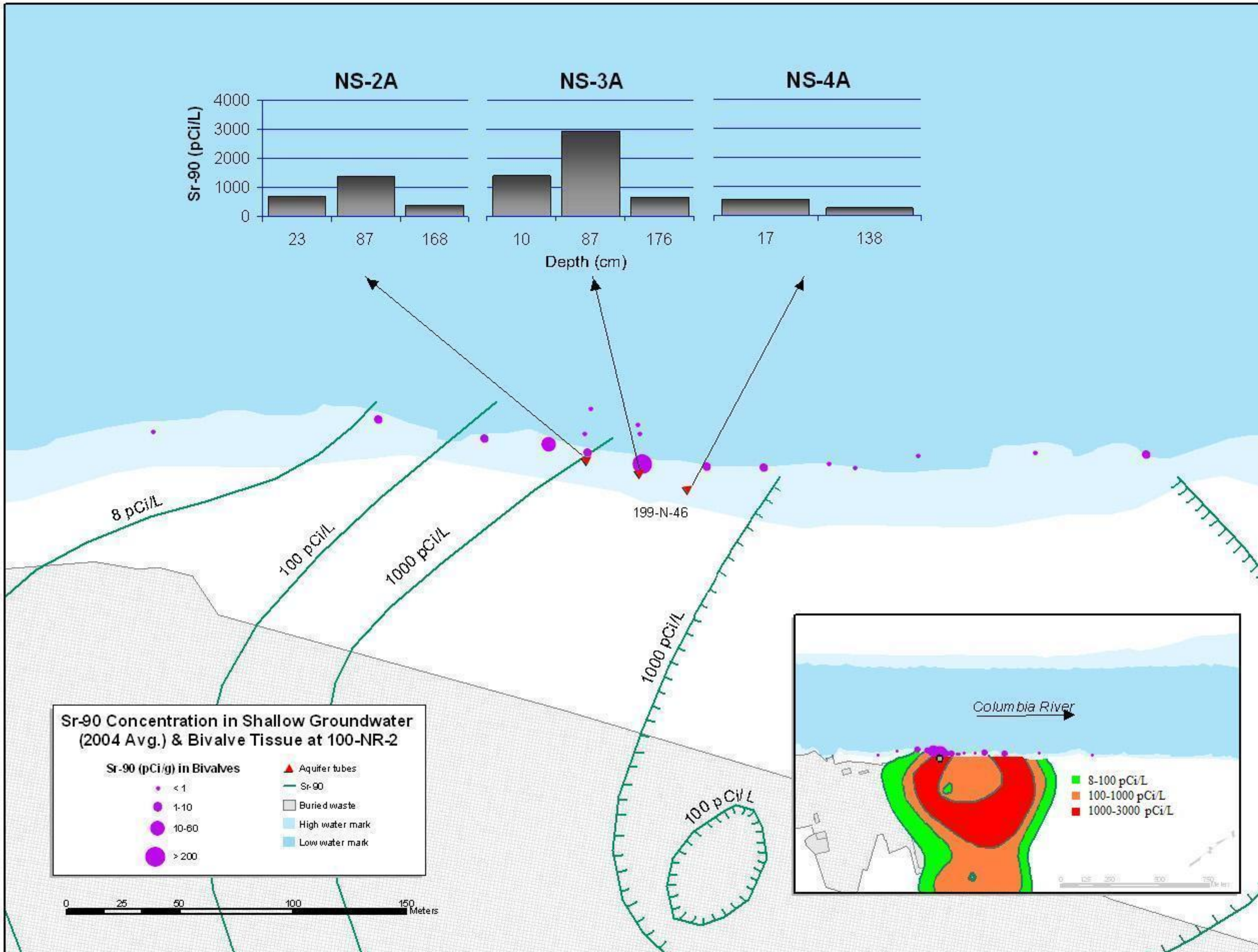
$$K_d = \frac{\text{mass of solute on solid phase per unit mass of solid phase}}{\text{concentration of solute in solution}}$$

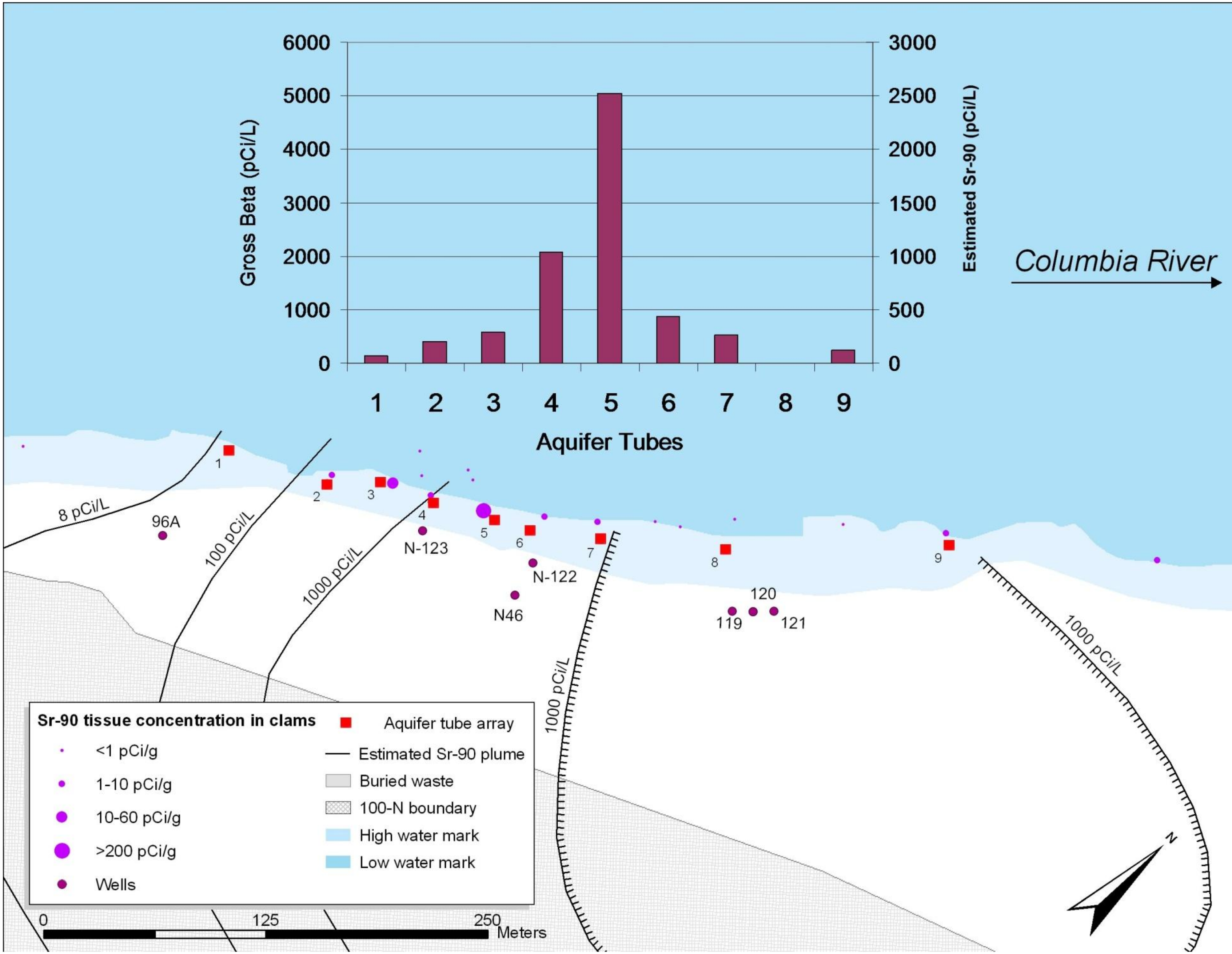
The K_d for Strontium-90 has been measured in over 80 separate tests for the 100-N soils (Serne and Legore, 1996). For the coarse grained sediments of the Ringold Formation, found in this area, Serne recommends a bulk distribution coefficient of 15 ml/g

Effects of Natural Radioactive Decay

- Sr-90 Half-Life is 28.6 years.
- 50% reduction of Sr-90 in soils and groundwater in less than 30 years
- 90% reduction of Sr-90 in soils and groundwater in less than 95 years


100-N
100-K

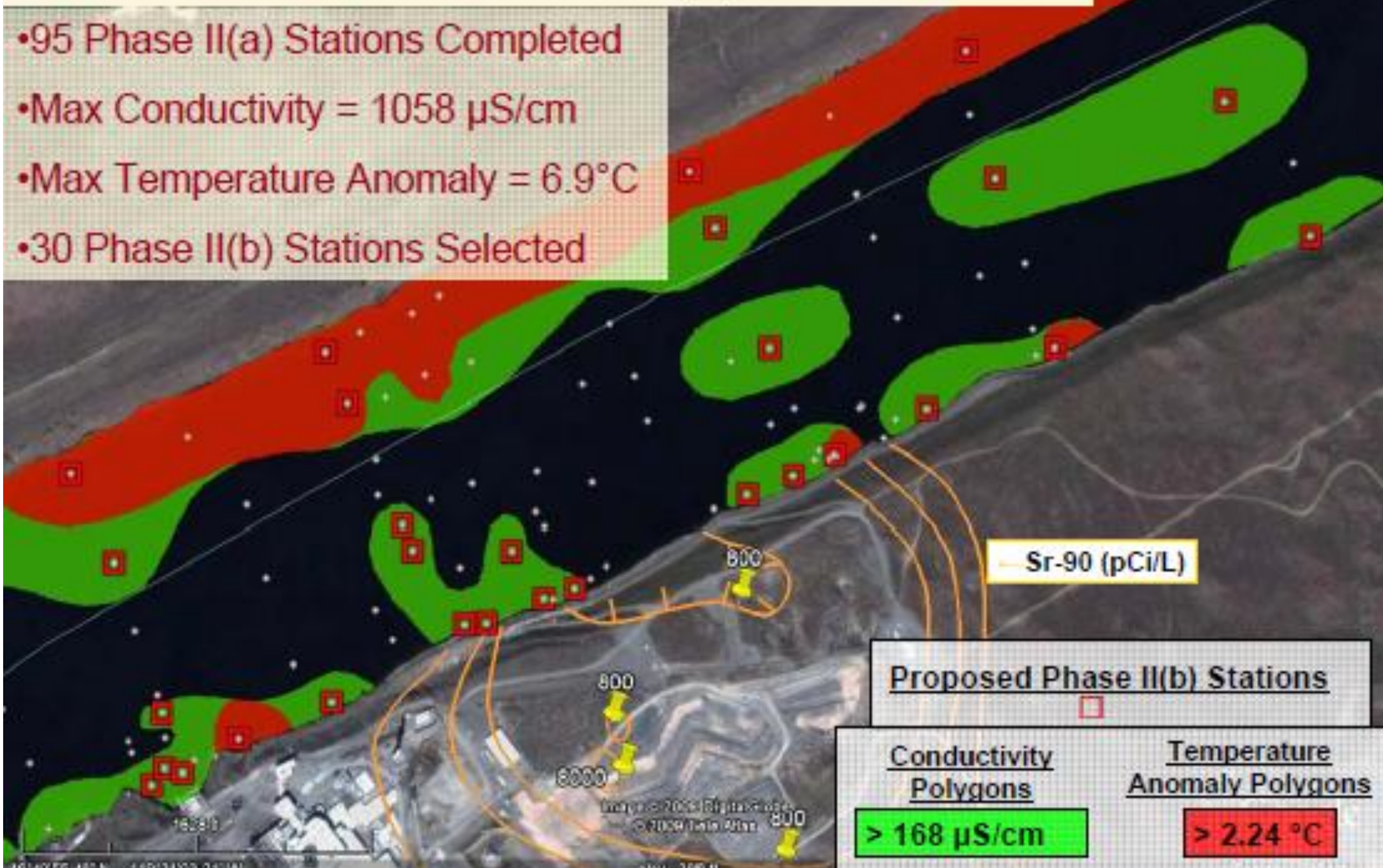

NS-2A
NS-3A
NS-4A
Sr-90 (pCi/L)
4000
3000
2000
1000
0
23
87
168
10
87
176
17
138
Depth (cm)
8 pCi/L
100 pCi/L
1000 pCi/L
1000 pCi/L
100 pCi/L
199-N-46
Columbia River
8-100 pCi/L
100-1000 pCi/L
1000-3000 pCi/L
Sr-90 Concentration in Shallow Groundwater
(2004 Avg.) & Bivalve Tissue at 100-NR-2
Sr-90 (pCi/g) in Bivalves
< 1
1-10
10-60
> 200
Aquifer tubes
Sr-90
Buried waste
High water mark
Low water mark
0
25
50
100
150
Meters



Gross Beta (pCi/L)
Estimated Sr-90 (pCi/L)
6000
5000
4000
3000
2000
1000
0
3000
2500
2000
1500
1000
500
0
1 2 3 4 5 6 7 8 9
Aquifer Tubes
Columbia River
8 pCi/L
100 pCi/L
1000 pCi/L
96A
N-123
N-122
N46
119
120
121
Sr-90 tissue concentration in clams
<1 pCi/g
1-10 pCi/g
10-60 pCi/g
>200 pCi/g
Wells
Aquifer tube array
Estimated Sr-90 plume
Buried waste
100-N boundary
High water mark
Low water mark
0
125
250
Meters
N

100-N Conductivity and Temperature Plumes and Phase II(b) Stations

- 95 Phase II(a) Stations Completed
- Max Conductivity = 1058 μS/cm
- Max Temperature Anomaly = 6.9°C
- 30 Phase II(b) Stations Selected



Phase II(b) Sr-90 Results (pCi/L): 100N Area

Field QC Qualifiers:

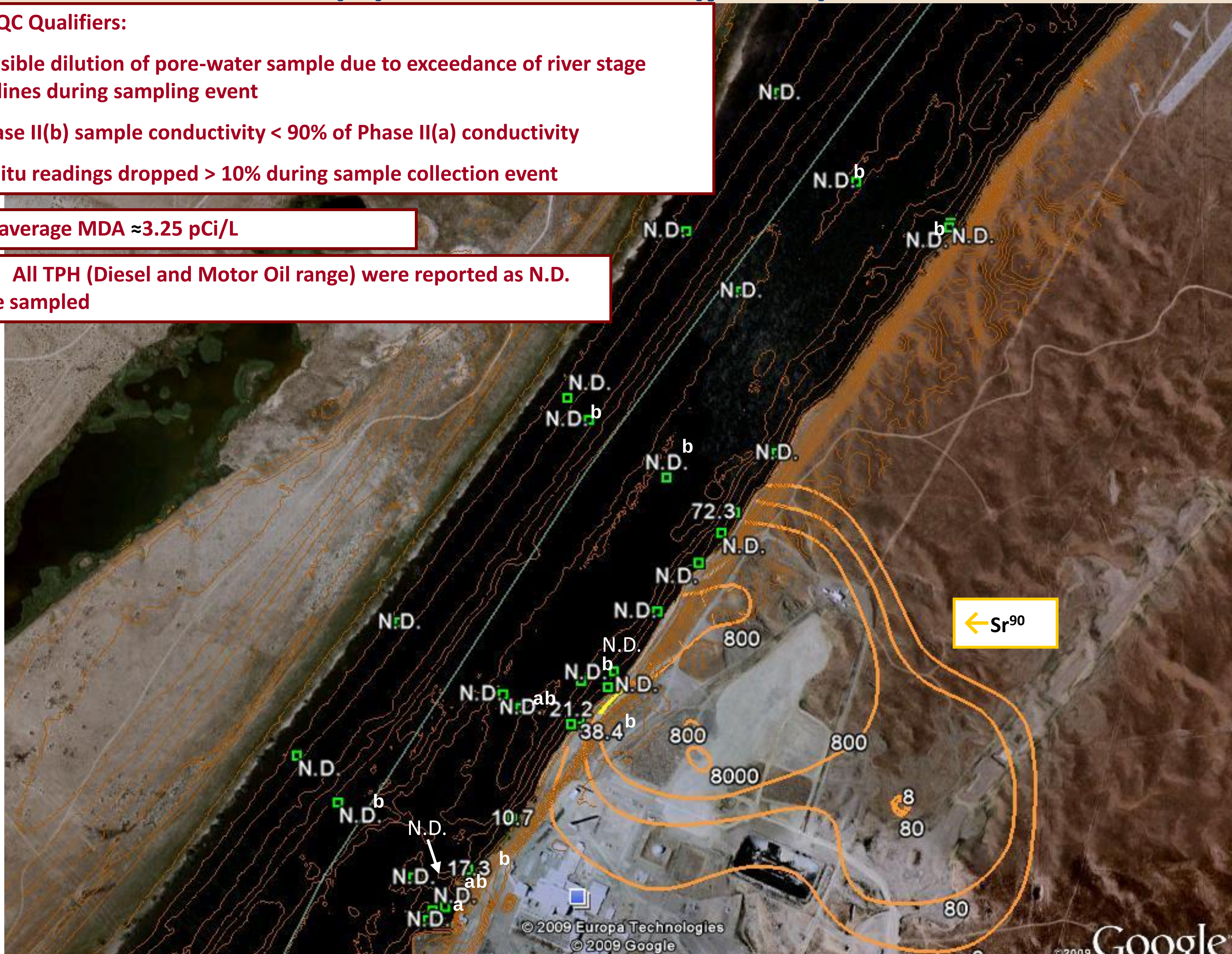
a) Possible dilution of pore-water sample due to exceedance of river stage guidelines during sampling event

b) Phase II(b) sample conductivity < 90% of Phase II(a) conductivity

c) In-situ readings dropped > 10% during sample collection event

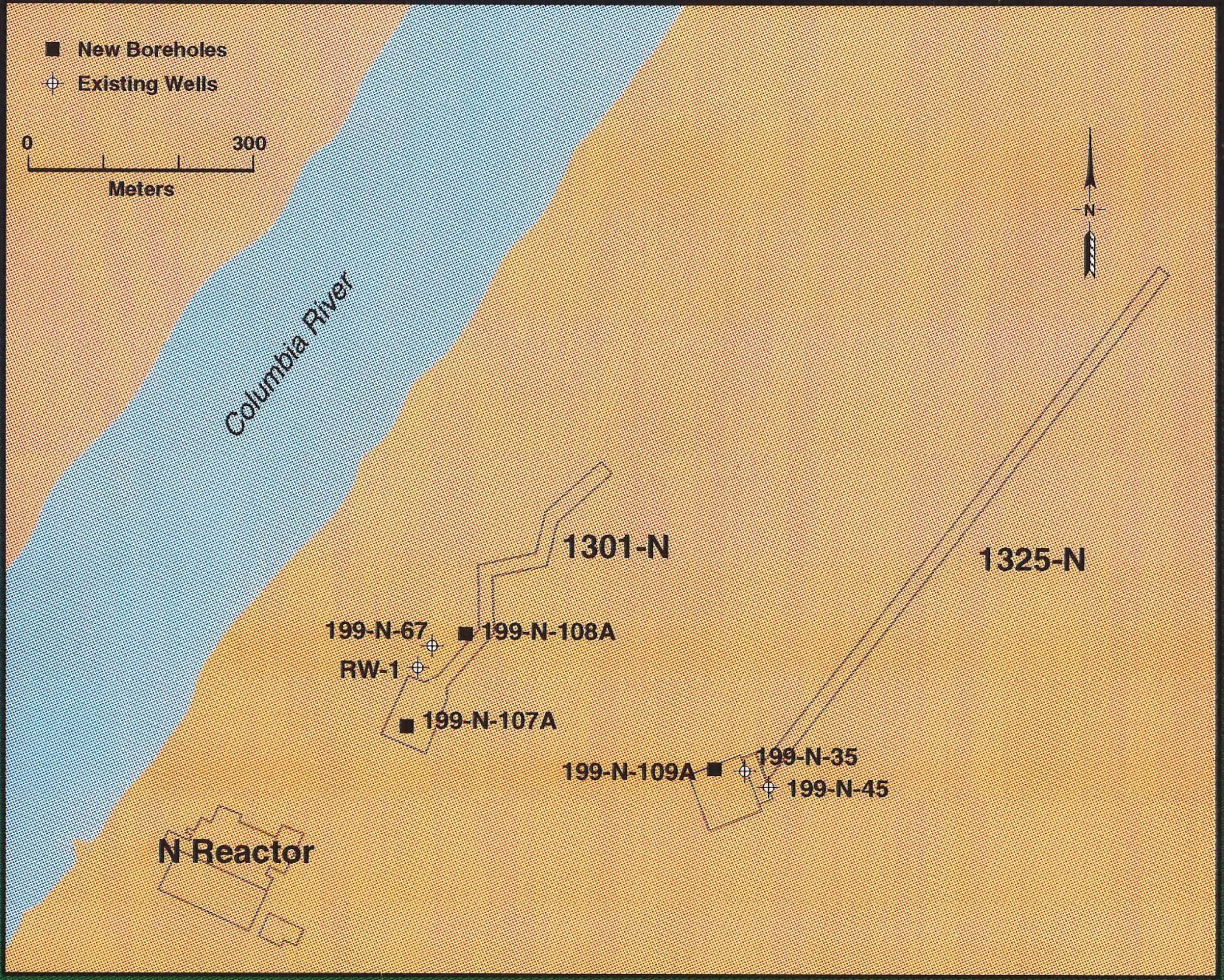
Sr-90 average MDA ≈3.25 pCi/L

Note: All TPH (Diesel and Motor Oil range) were reported as N.D. where sampled



LWDF LFI Data Slides

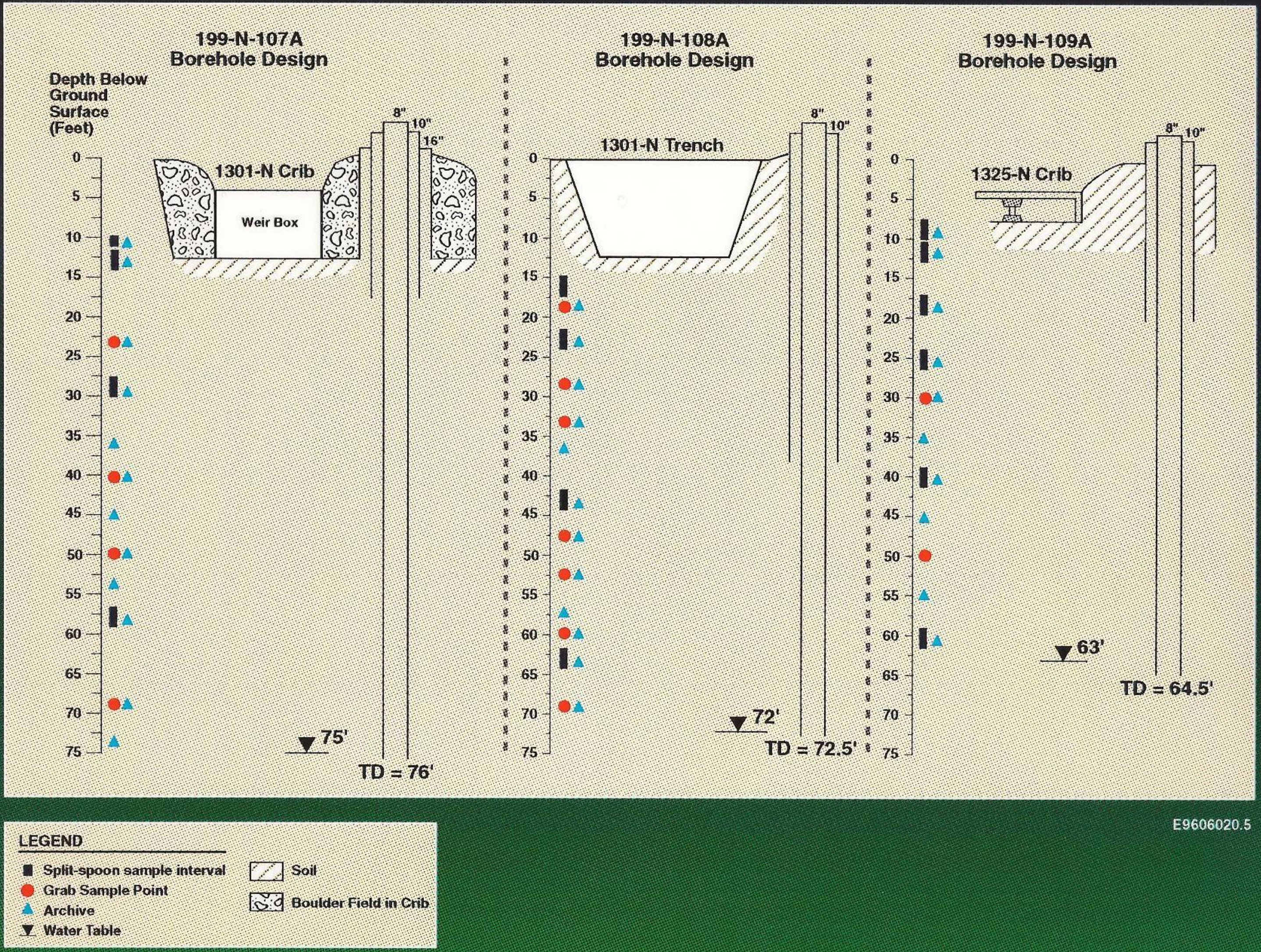
Hanford ERC Team

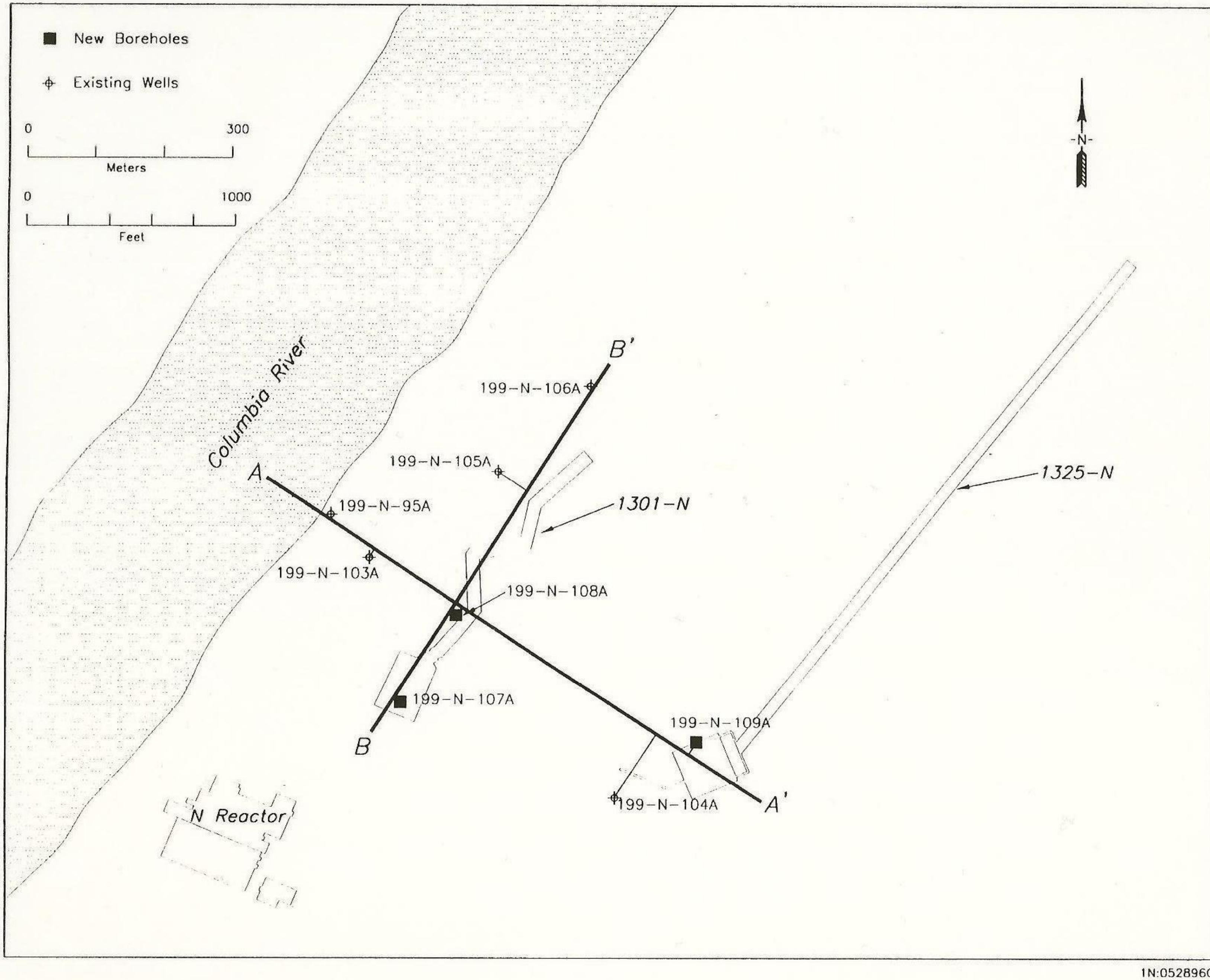


E9606020.33

Hanford ERC Team

Depths of Samples at Boreholes

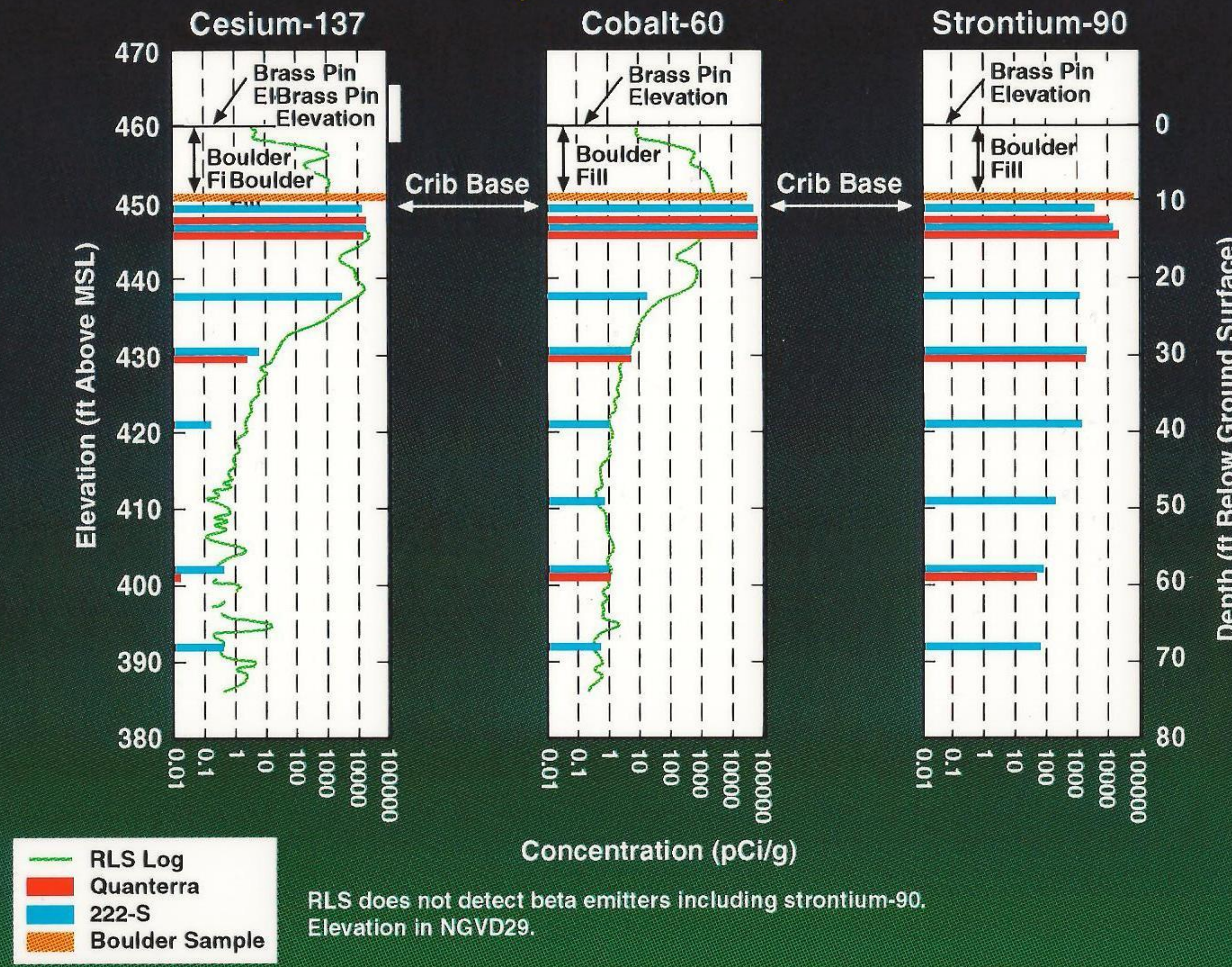




Cross-Sections A to A' and B to B'

Radionuclide Contamination with Depth, 199-N-107A

(1301-N Crib)



RLS does not detect beta emitters including strontium-90.
Elevation in NGVD29.

E9606020.4

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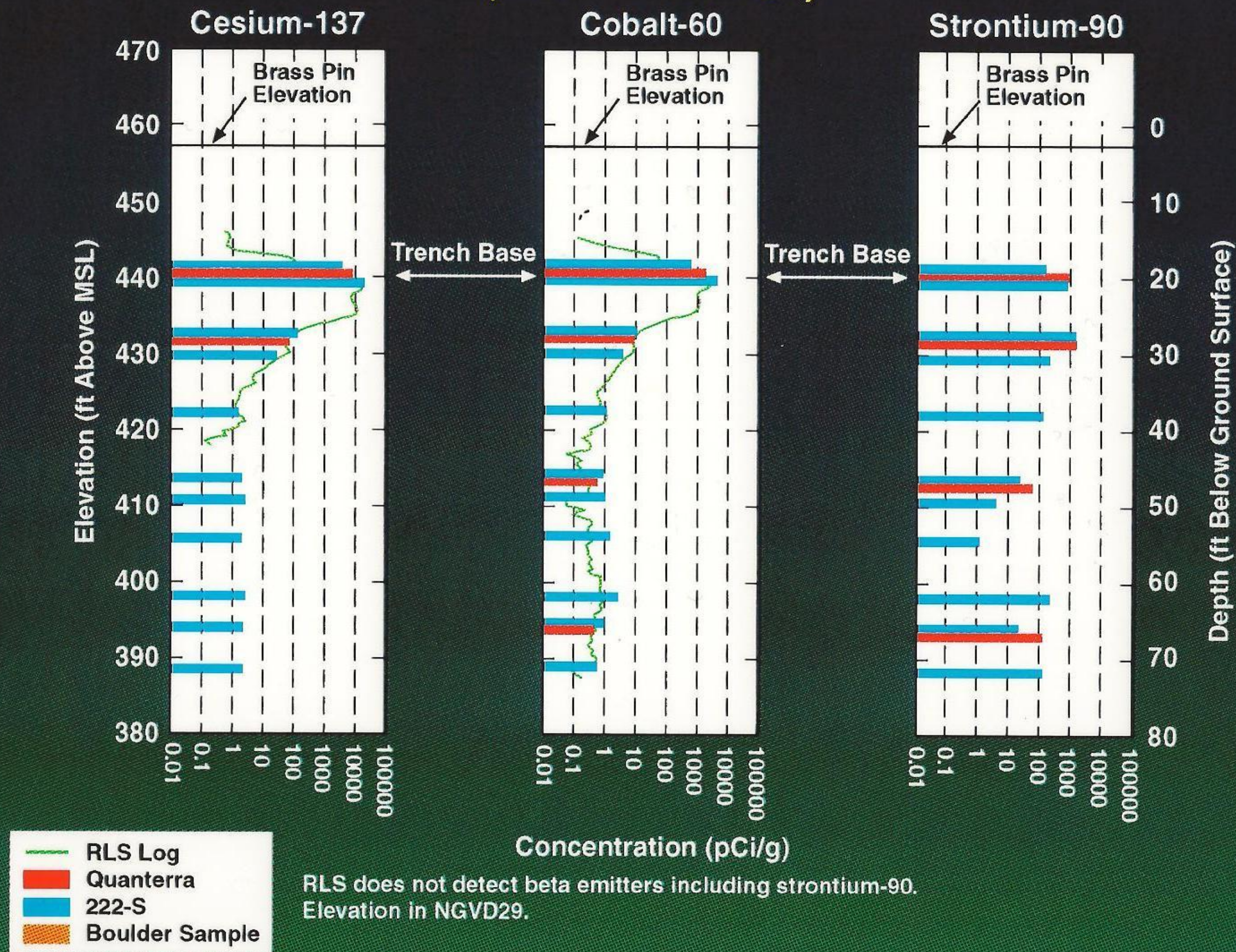
Environmental Excellence HANFORD

Radionuclide Contamination with Depth, 199-N-108A

(1301-N Trench)



RLS does not detect beta emitters including strontium-90.
Elevation in NGVD29.

E9606020.32

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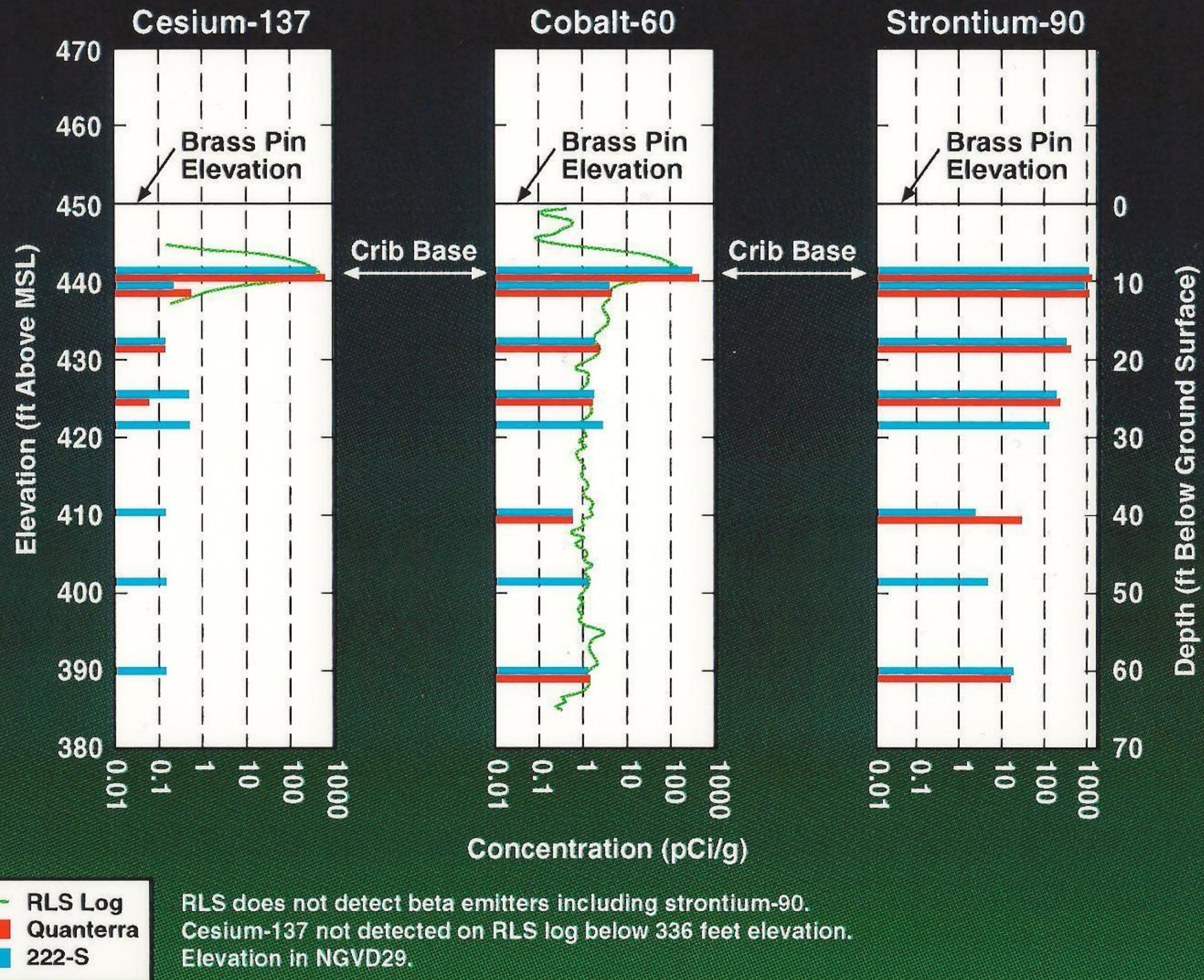
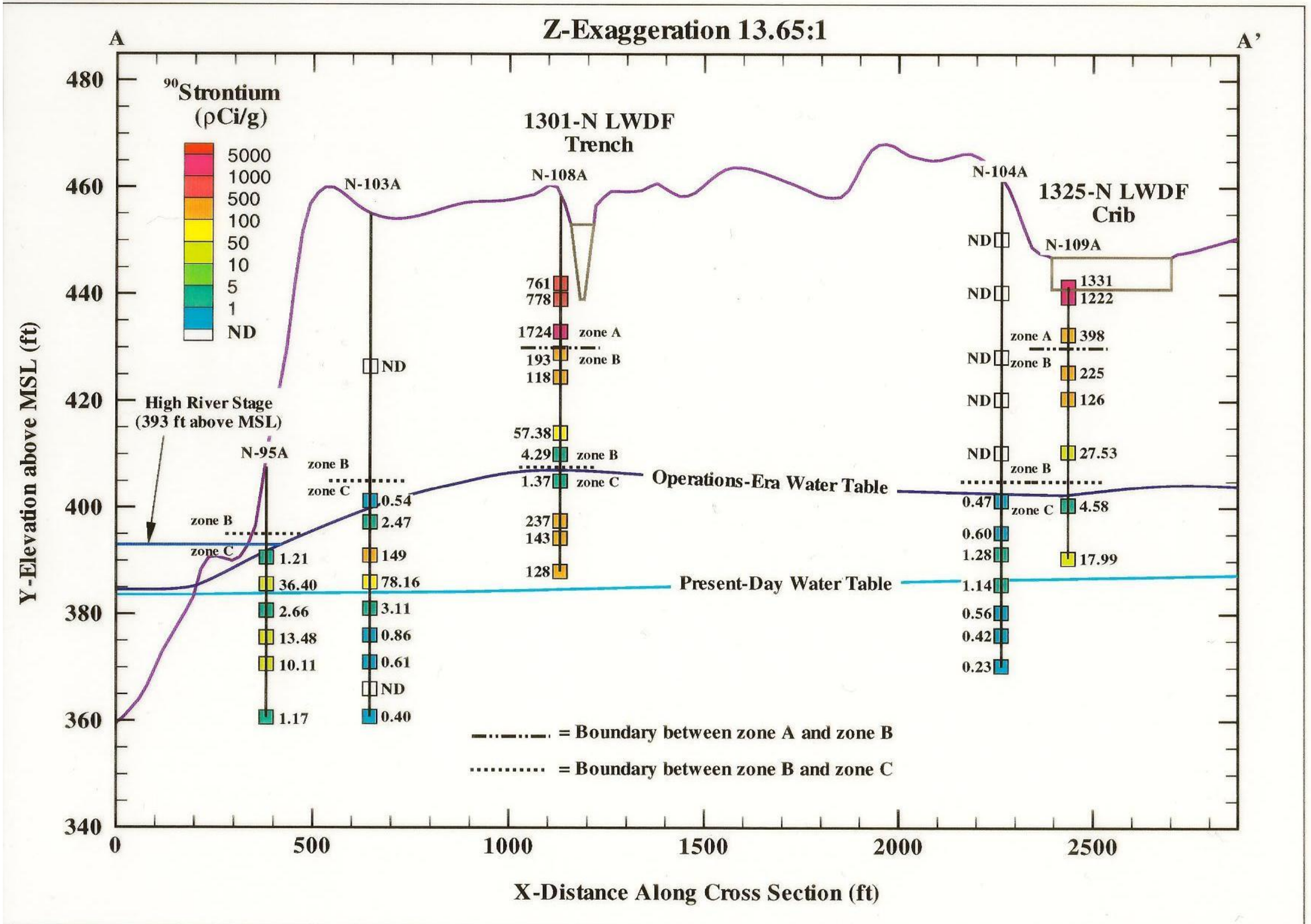
Radionuclide Contamination with Depth, 199-N-109A
(1325-N Crib)

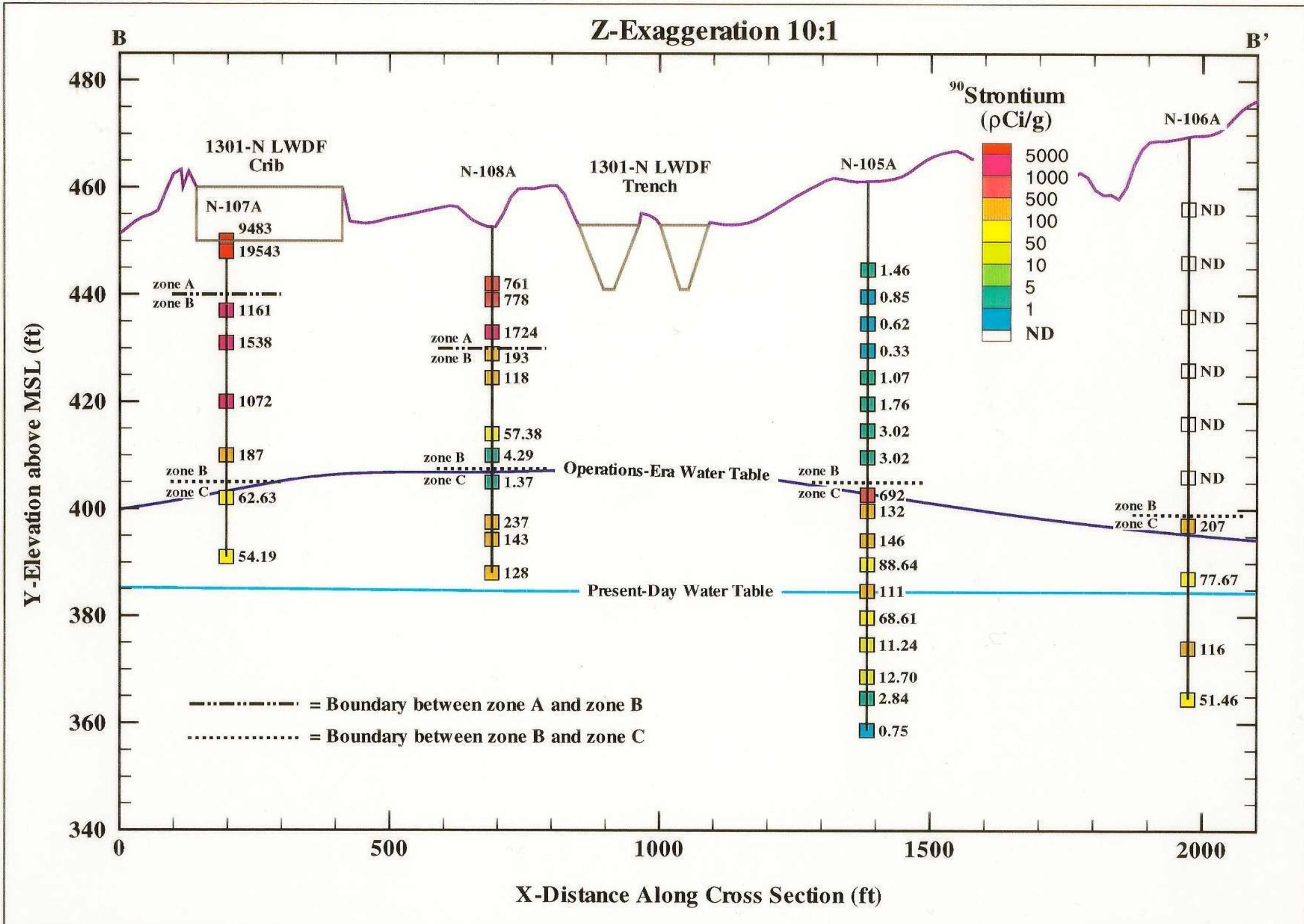


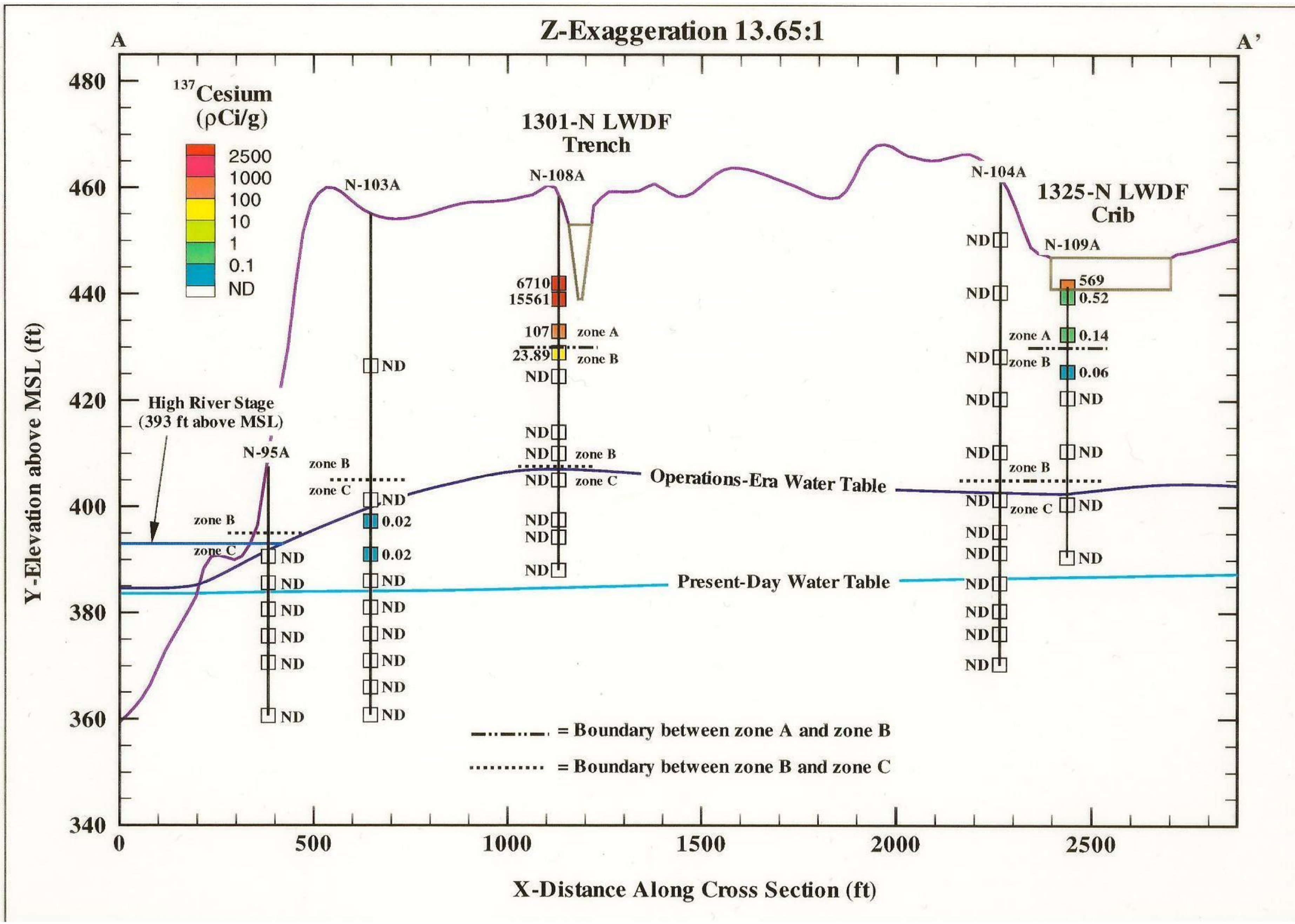
RLS does not detect beta emitters including strontium-90.
Cesium-137 not detected on RLS log below 336 feet elevation.
Elevation in NGVD29.

E9606020.3

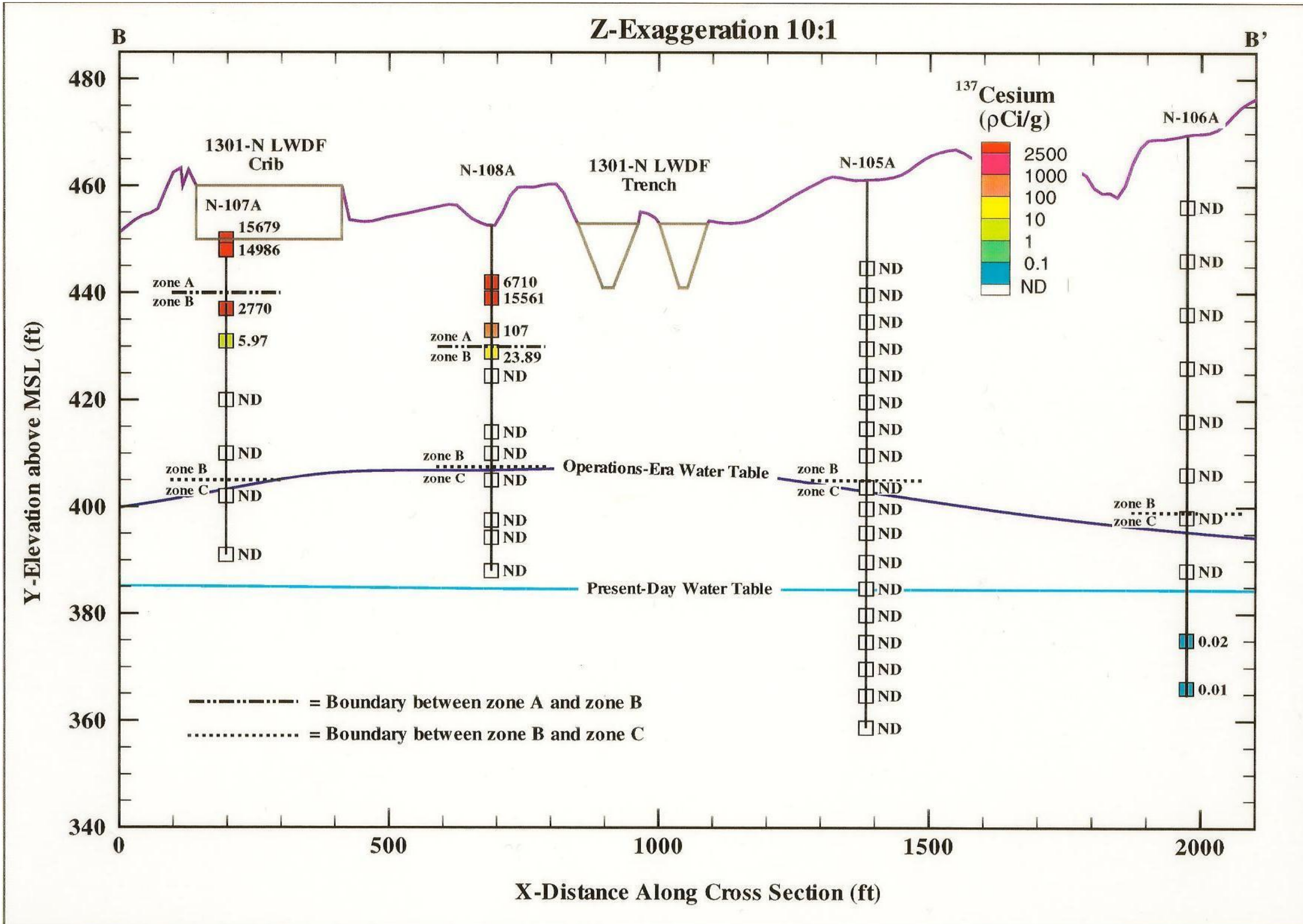


Z-Exaggeration 13.65:1
A
A'
90Strontium (ρCi/g)
5000
1000
500
100
50
10
5
1
ND
1301-N LWDF Trench
1325-N LWDF Crib
N-95A
N-103A
N-108A
N-104A
N-109A
High River Stage (393 ft above MSL)
Operations-Era Water Table
Present-Day Water Table
zone A
zone B
zone C
761
778
1724
193
118
57.38
4.29
1.37
237
143
128
0.54
2.47
149
78.16
3.11
0.86
0.61
ND
0.40
1.21
36.40
2.66
13.48
10.11
1.17
0.47
0.60
1.28
1.14
0.56
0.42
0.23
1331
1222
398
225
126
27.53
4.58
17.99
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
X-Distance Along Cross Section (ft)

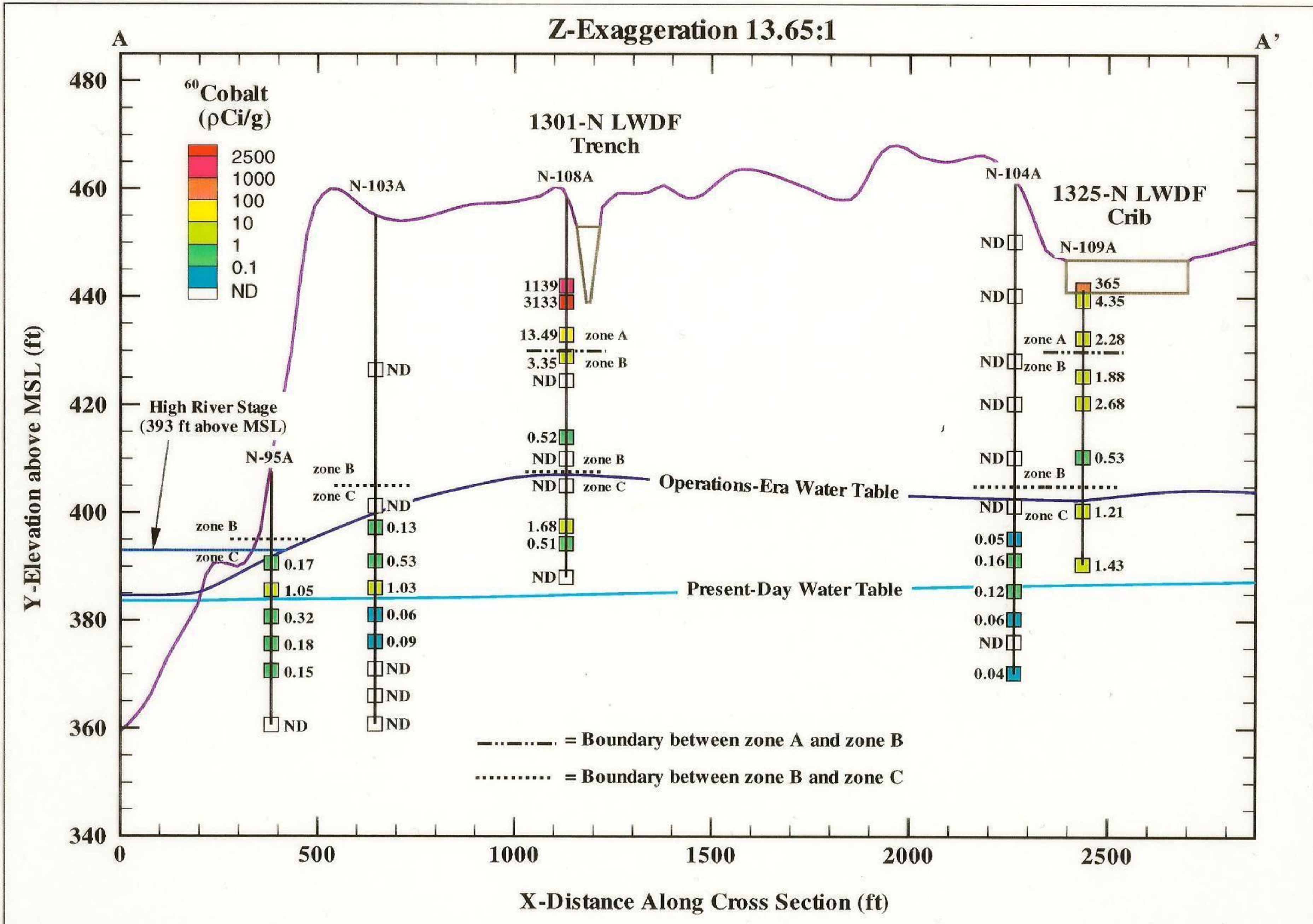

Z-Exaggeration 10:1
B
B'
90Strontium (ρCi/g)
5000
1000
500
100
50
10
5
1
ND
1301-N LWDF Crib
N-107A
9483
19543
zone A
zone B
1161
1538
1072
187
zone B
zone C
62.63
54.19
N-108A
761
778
1724
zone A
zone B
193
118
57.38
zone B
4.29
zone C
1.37
237
143
128
1301-N LWDF Trench
Operations-Era Water Table
Present-Day Water Table
N-105A
1.46
0.85
0.62
0.33
1.07
1.76
3.02
3.02
zone B
zone C
692
132
146
88.64
111
68.61
11.24
12.70
2.84
0.75
N-106A
ND
ND
ND
ND
ND
ND
zone B
zone C
207
77.67
116
51.46
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
480
460
440
420
400
380
360
340
X-Distance Along Cross Section (ft)
0
500
1000
1500
2000



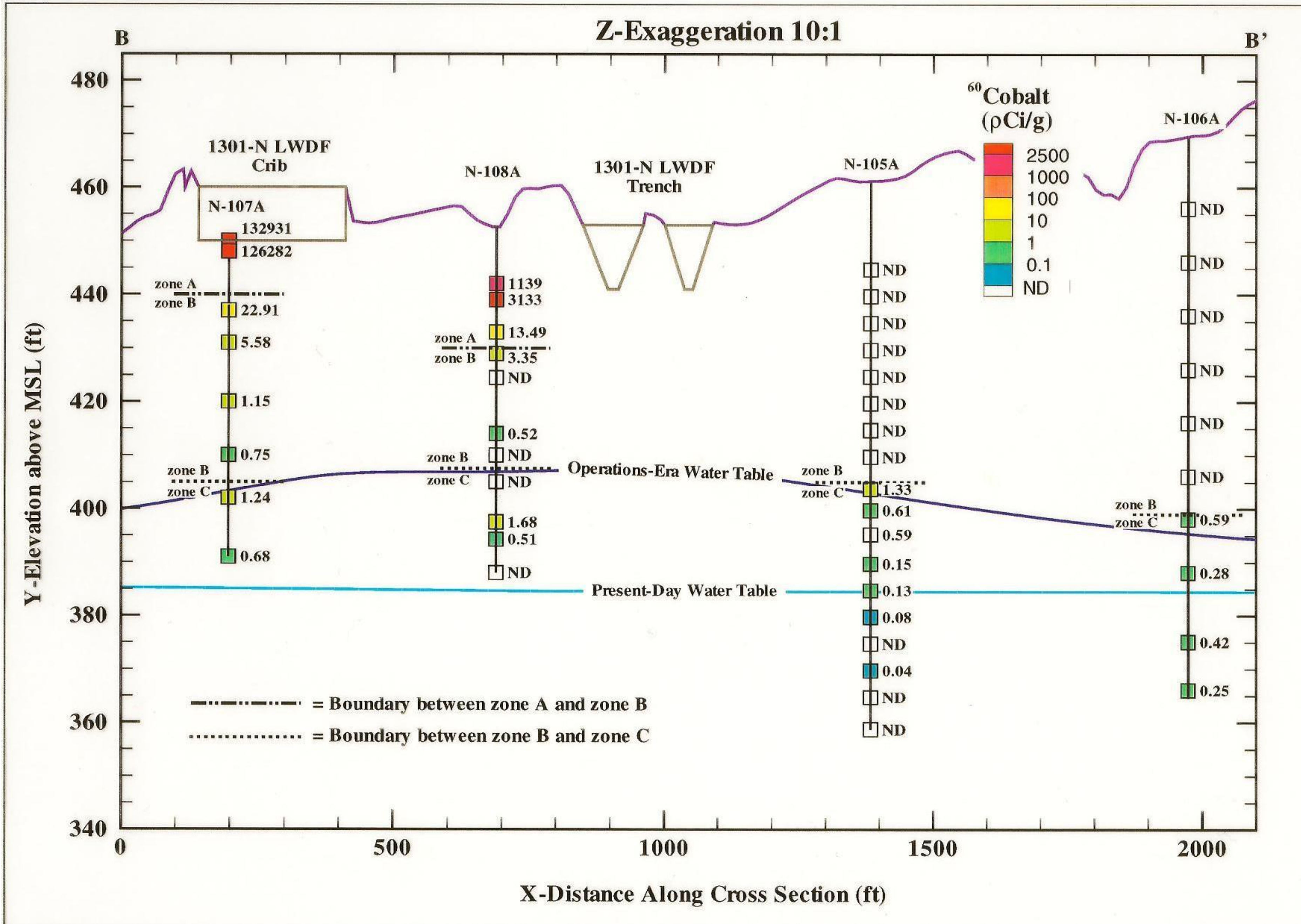
Z-Exaggeration 13.65:1
A
A'
137 Cesium (ρCi/g)
2500
1000
100
10
1
0.1
ND
1301-N LWDF Trench
1325-N LWDF Crib
N-103A
N-108A
N-104A
N-109A
N-95A
6710
15561
107
23.89
569
0.52
0.14
0.06
0.02
0.02
zone A
zone B
zone C
High River Stage (393 ft above MSL)
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
X-Distance Along Cross Section (ft)
480
460
440
420
400
380
360
340
0
500
1000
1500
2000
2500



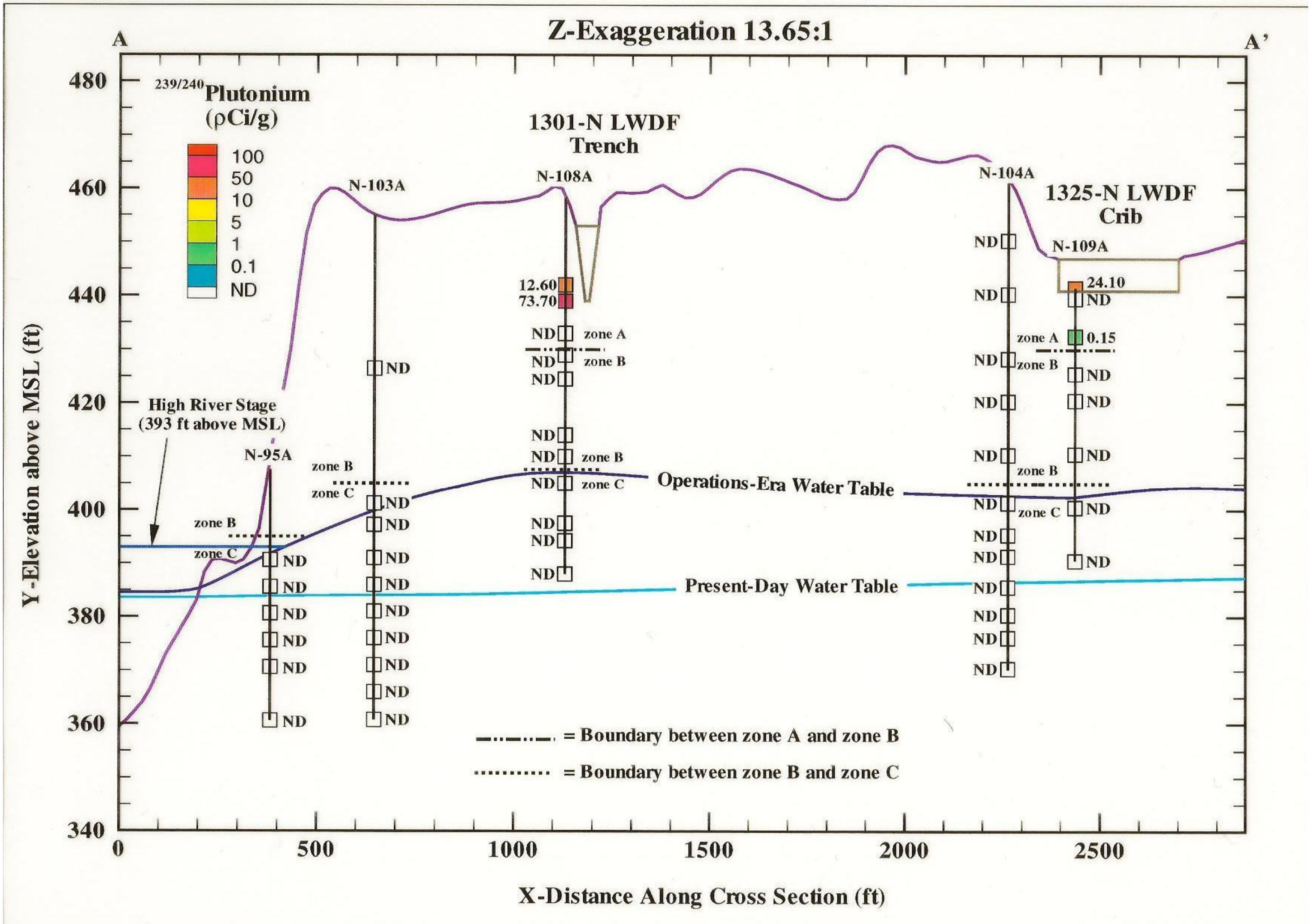
Z-Exaggeration 10:1
B
B'
137Cesium (ρCi/g)
2500
1000
100
10
1
0.1
ND
1301-N LWDF Crib
N-107A
15679
14986
zone A
zone B
2770
5.97
ND
ND
zone B
zone C
ND
ND
N-108A
6710
15561
107
zone A
zone B
23.89
1301-N LWDF Trench
N-105A
N-106A
0.02
0.01
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
X-Distance Along Cross Section (ft)



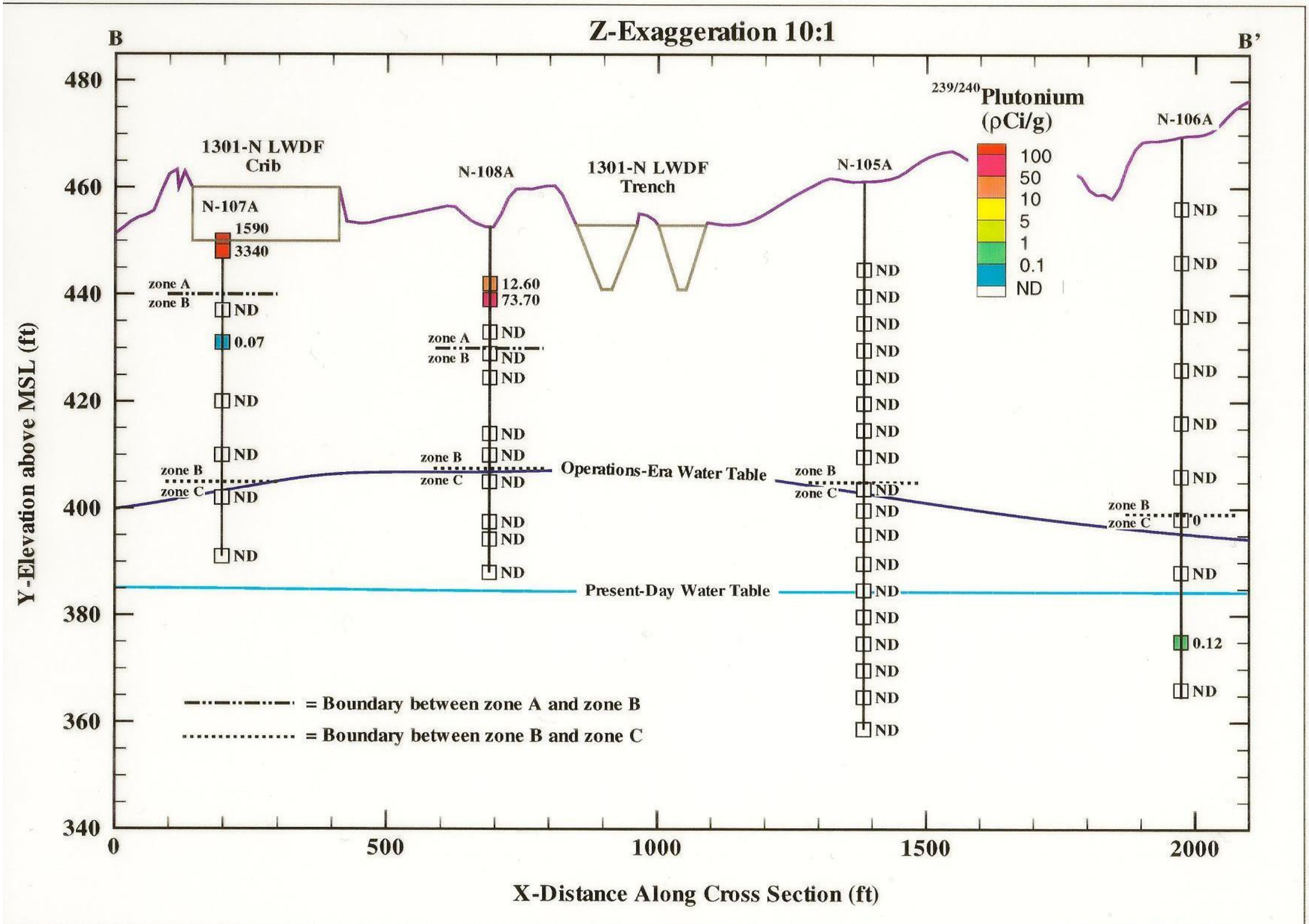
Z-Exaggeration 13.65:1
A
A'
^{60}Cobalt (ρCi/g)
2500
1000
100
10
1
0.1
ND
1301-N LWDF Trench
1325-N LWDF Crib
N-103A
N-108A
N-104A
N-109A
N-95A
High River Stage (393 ft above MSL)
Operations-Era Water Table
Present-Day Water Table
zone A
zone B
zone C
1139
3133
13.49
3.35
0.52
1.68
0.51
365
4.35
2.28
1.88
2.68
0.53
1.21
1.43
0.05
0.16
0.12
0.06
0.04
0.17
1.05
0.32
0.18
0.15
0.13
0.53
1.03
0.06
0.09
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
X-Distance Along Cross Section (ft)



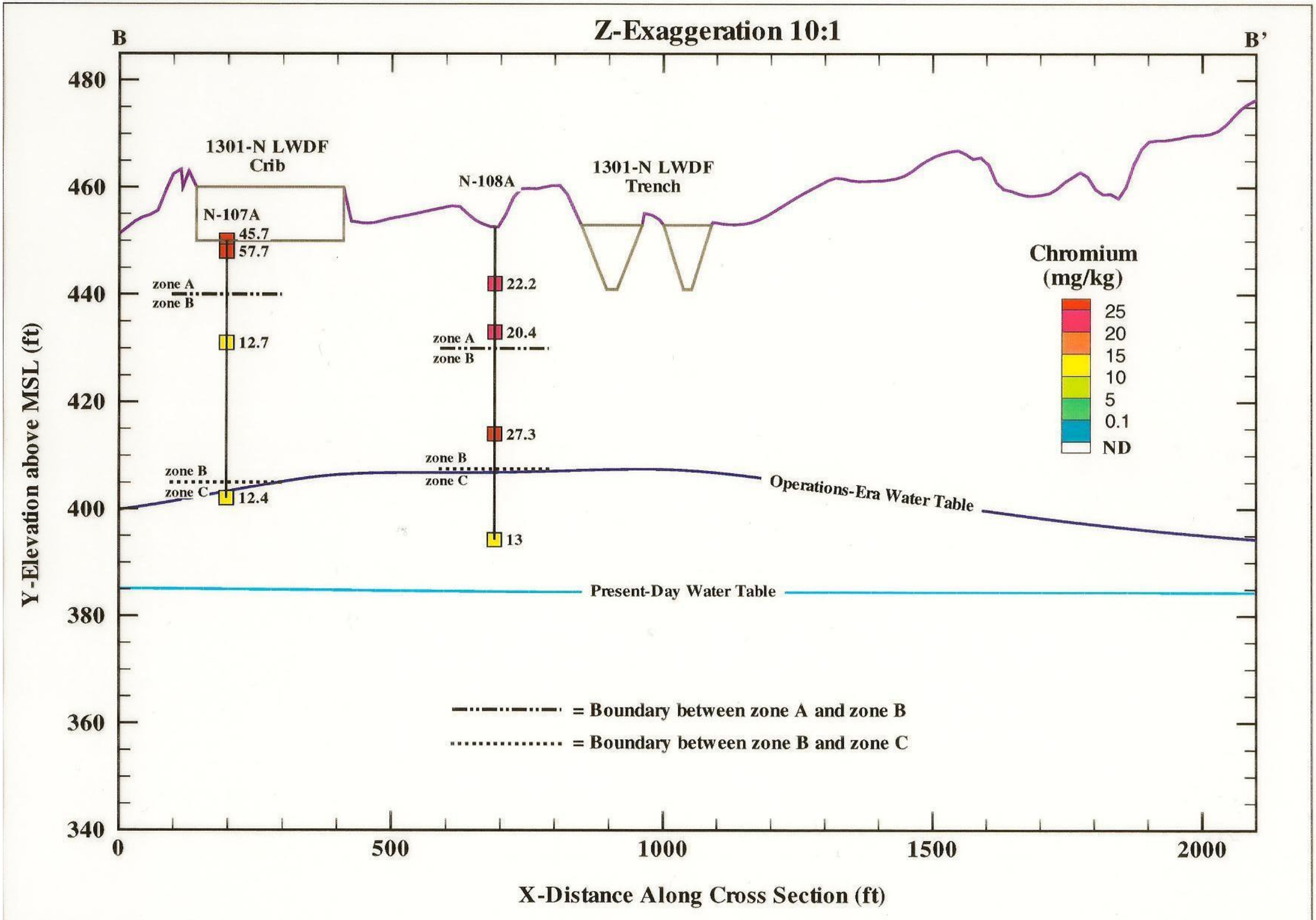
Z-Exaggeration 10:1
B
B'
Y-Elevation above MSL (ft)
X-Distance Along Cross Section (ft)
^{60}Cobalt
(ρCi/g)
2500
1000
100
10
1
0.1
ND
1301-N LWDF
Crib
N-107A
132931
126282
22.91
5.58
1.15
0.75
1.24
0.68
N-108A
1139
3133
13.49
3.35
ND
0.52
ND
ND
1.68
0.51
ND
1301-N LWDF
Trench
N-105A
ND
1.33
0.61
0.59
0.15
0.13
0.08
ND
0.04
ND
N-106A
ND
0.59
0.28
0.42
0.25
zone A
zone B
zone C
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C

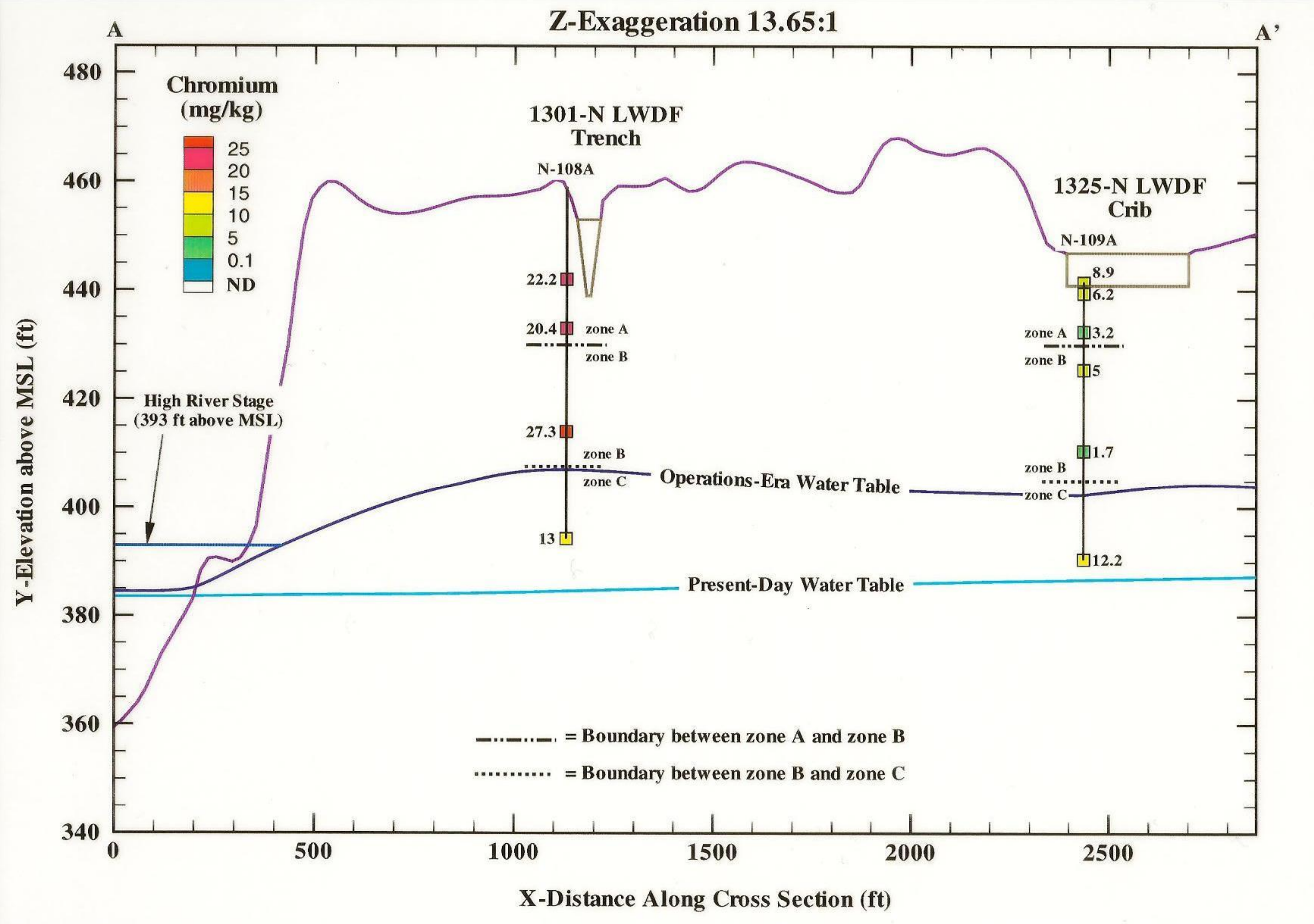


Z-Exaggeration 13.65:1
A
A'
239/240 Plutonium (ρCi/g)
100
50
10
5
1
0.1
ND
1301-N LWDF Trench
1325-N LWDF Crib
N-103A
N-108A
N-104A
N-109A
N-95A
12.60
73.70
24.10
0.15
zone A
zone B
zone C
High River Stage (393 ft above MSL)
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
X-Distance Along Cross Section (ft)
480
460
440
420
400
380
360
340
0
500
1000
1500
2000
2500

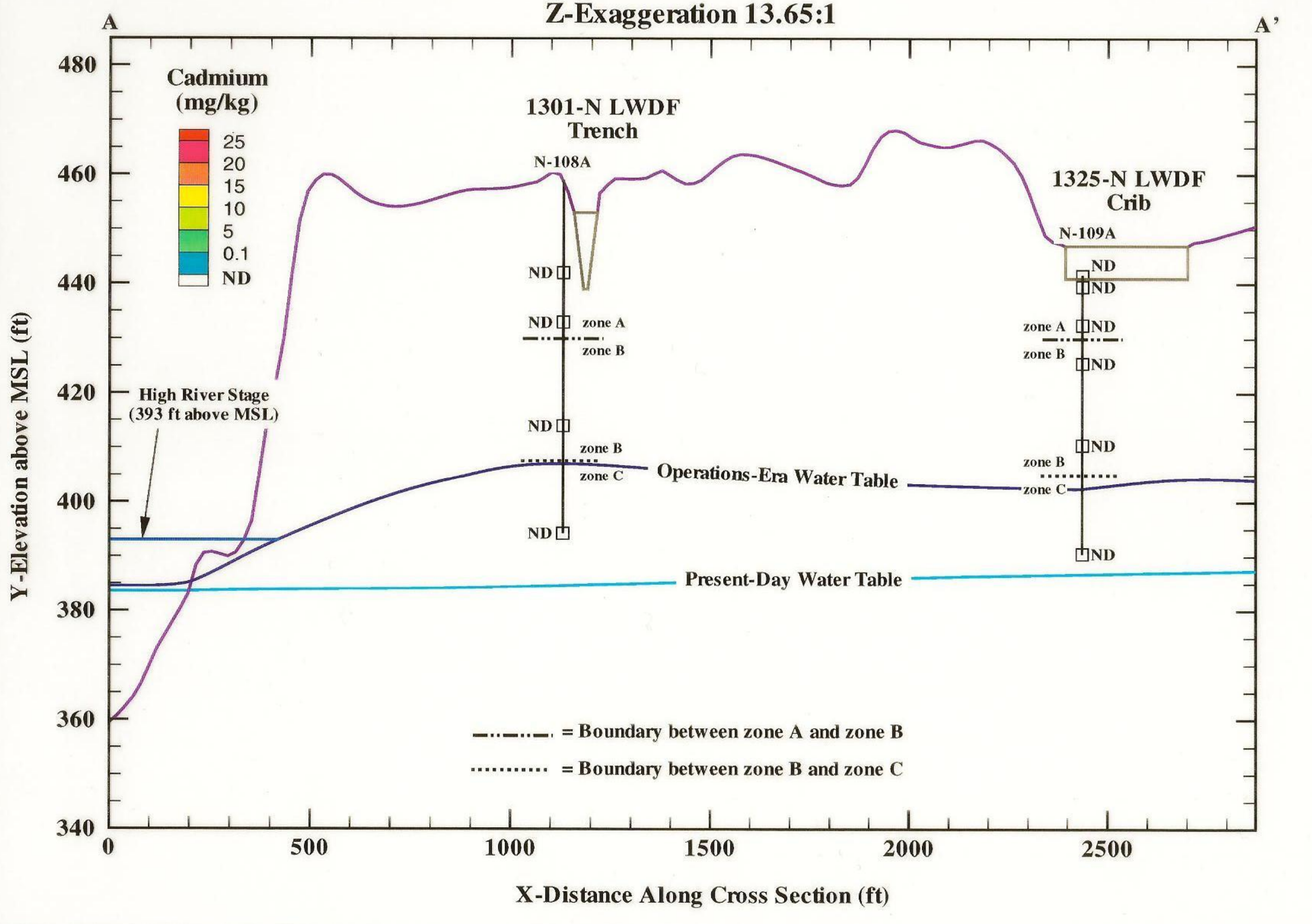


Z-Exaggeration 10:1
B
B'
239/240Plutonium (ρCi/g)
100
50
10
5
1
0.1
ND
1301-N LWDF Crib
N-107A
1590
3340
N-108A
12.60
73.70
1301-N LWDF Trench
N-105A
N-106A
0.07
0.12
zone A
zone B
zone C
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
X-Distance Along Cross Section (ft)

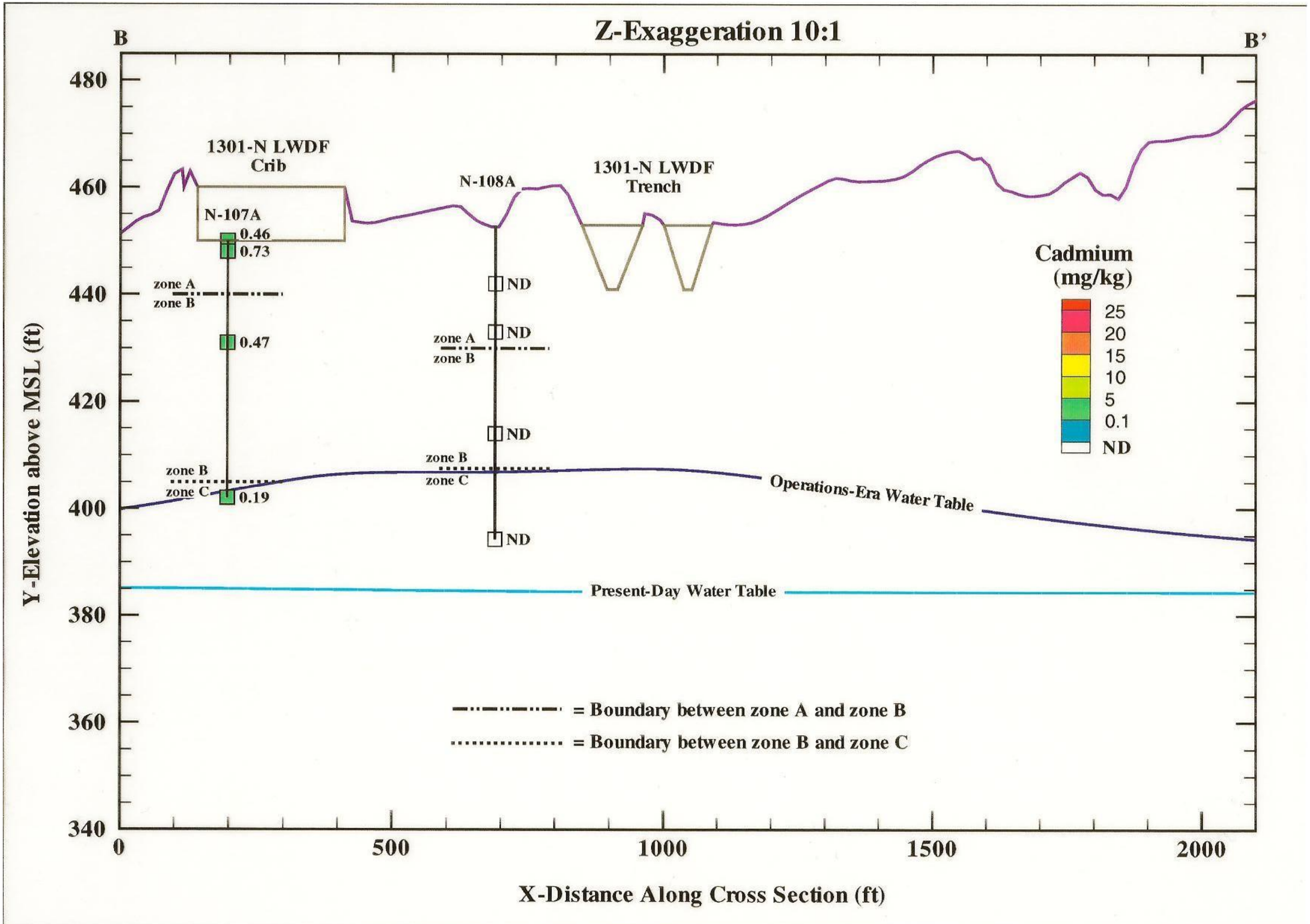

Z-Exaggeration 10:1
B
B'
1301-N LWDF Crib
N-107A
45.7
57.7
zone A
zone B
12.7
zone B
zone C
12.4
N-108A
22.2
20.4
zone A
zone B
27.3
zone B
zone C
13
1301-N LWDF Trench
Chromium (mg/kg)
25
20
15
10
5
0.1
ND
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
480
460
440
420
400
380
360
340
0
500
1000
1500
2000
X-Distance Along Cross Section (ft)



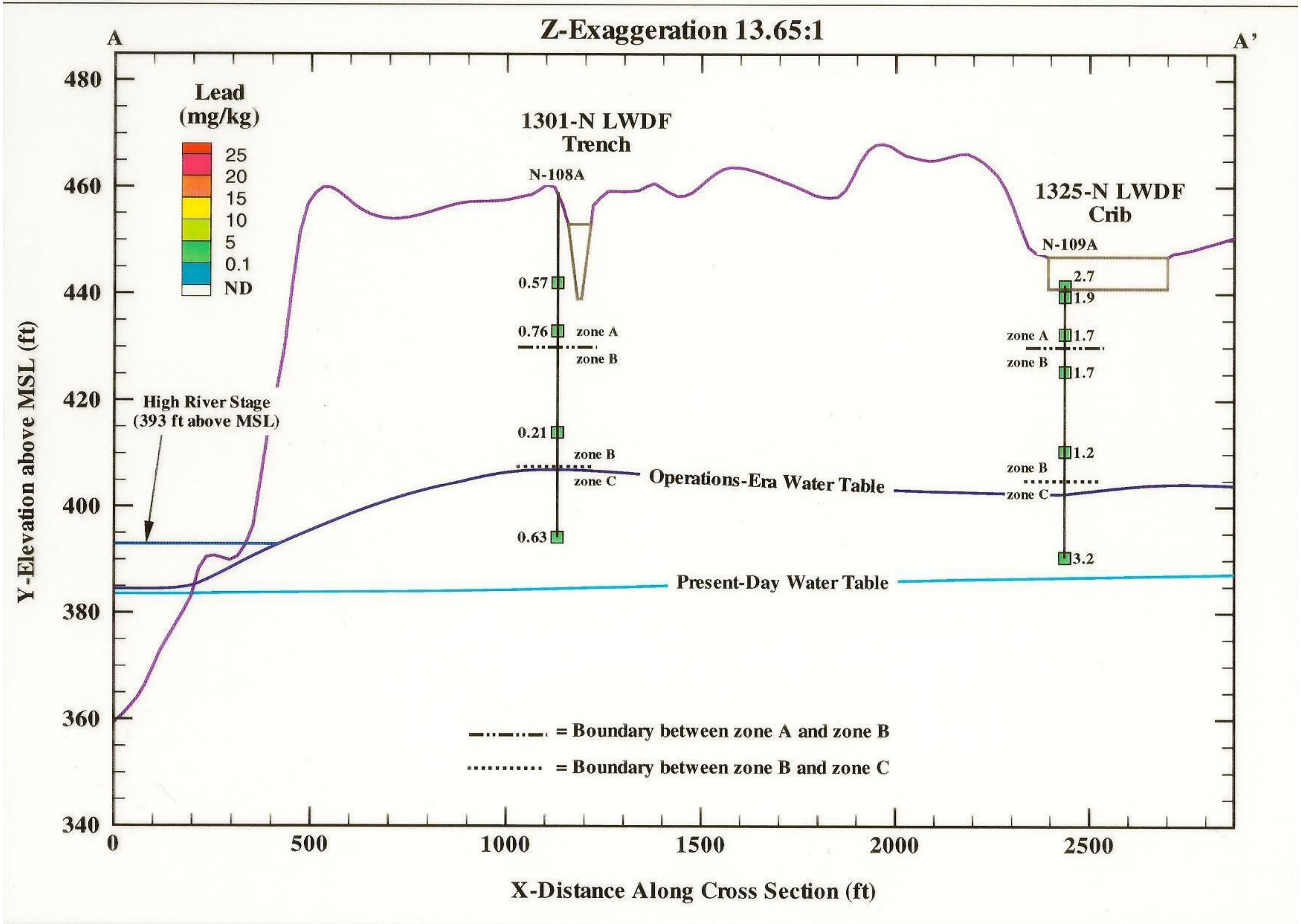
Z-Exaggeration 13.65:1
A
A'
Chromium (mg/kg)
25
20
15
10
5
0.1
ND
1301-N LWDF Trench
N-108A
22.2
20.4
zone A
zone B
27.3
zone B
zone C
13
1325-N LWDF Crib
N-109A
8.9
6.2
zone A
3.2
zone B
5
1.7
zone B
zone C
12.2
High River Stage (393 ft above MSL)
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
480
460
440
420
400
380
360
340
0
500
1000
1500
2000
2500
X-Distance Along Cross Section (ft)

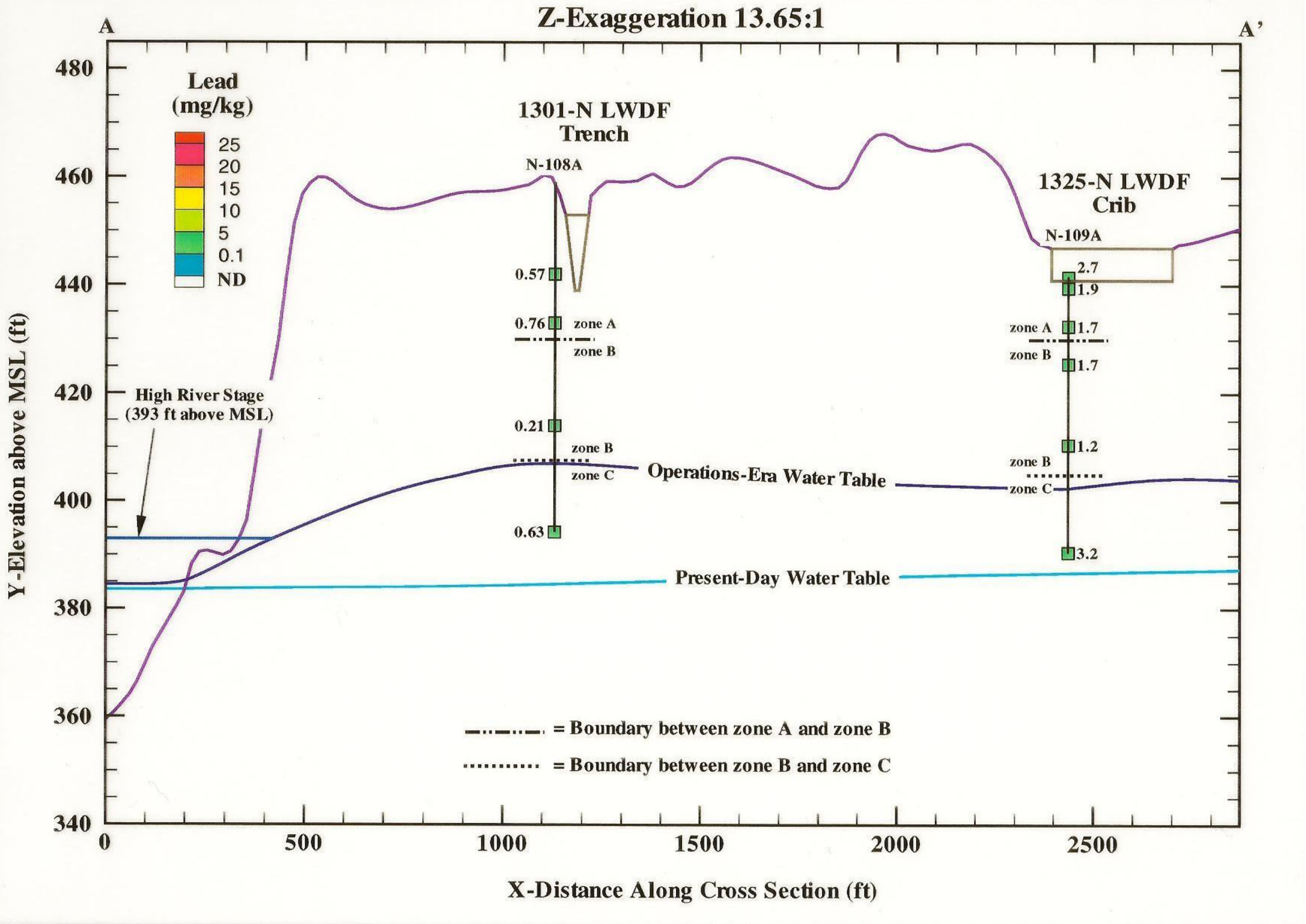


Z-Exaggeration 13.65:1
A
A'
Cadmium (mg/kg)
25
20
15
10
5
0.1
ND
1301-N LWDF Trench
N-108A
1325-N LWDF Crib
N-109A
ND
zone A
zone B
zone C
High River Stage (393 ft above MSL)
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
X-Distance Along Cross Section (ft)
480
460
440
420
400
380
360
340
0
500
1000
1500
2000
2500

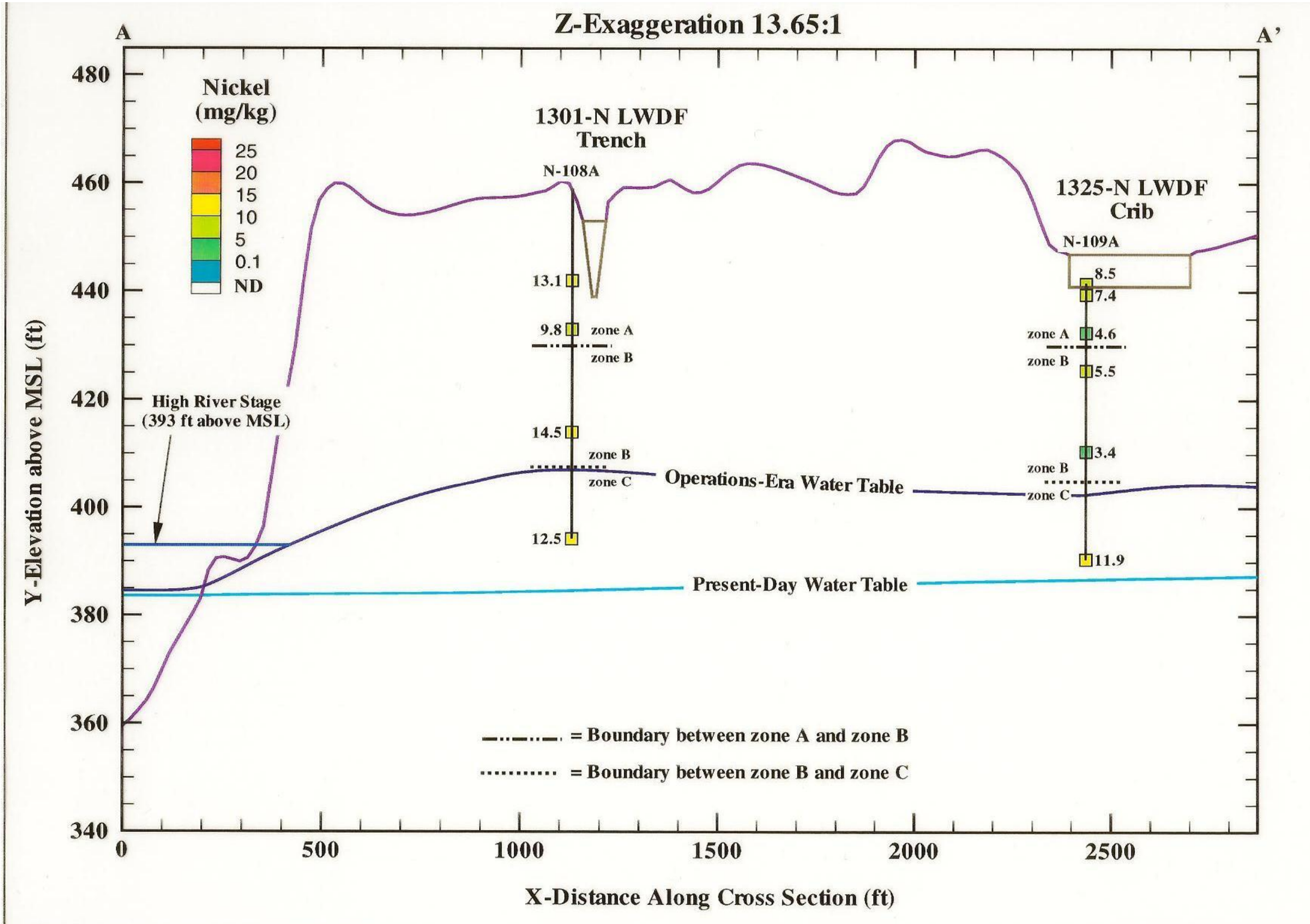


Z-Exaggeration 10:1
B
B'
1301-N LWDF Crib
N-107A
0.46
0.73
0.47
0.19
N-108A
ND
ND
ND
ND
1301-N LWDF Trench
zone A
zone B
zone C
Cadmium (mg/kg)
25
20
15
10
5
0.1
ND
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
480
460
440
420
400
380
360
340
0
500
1000
1500
2000
X-Distance Along Cross Section (ft)

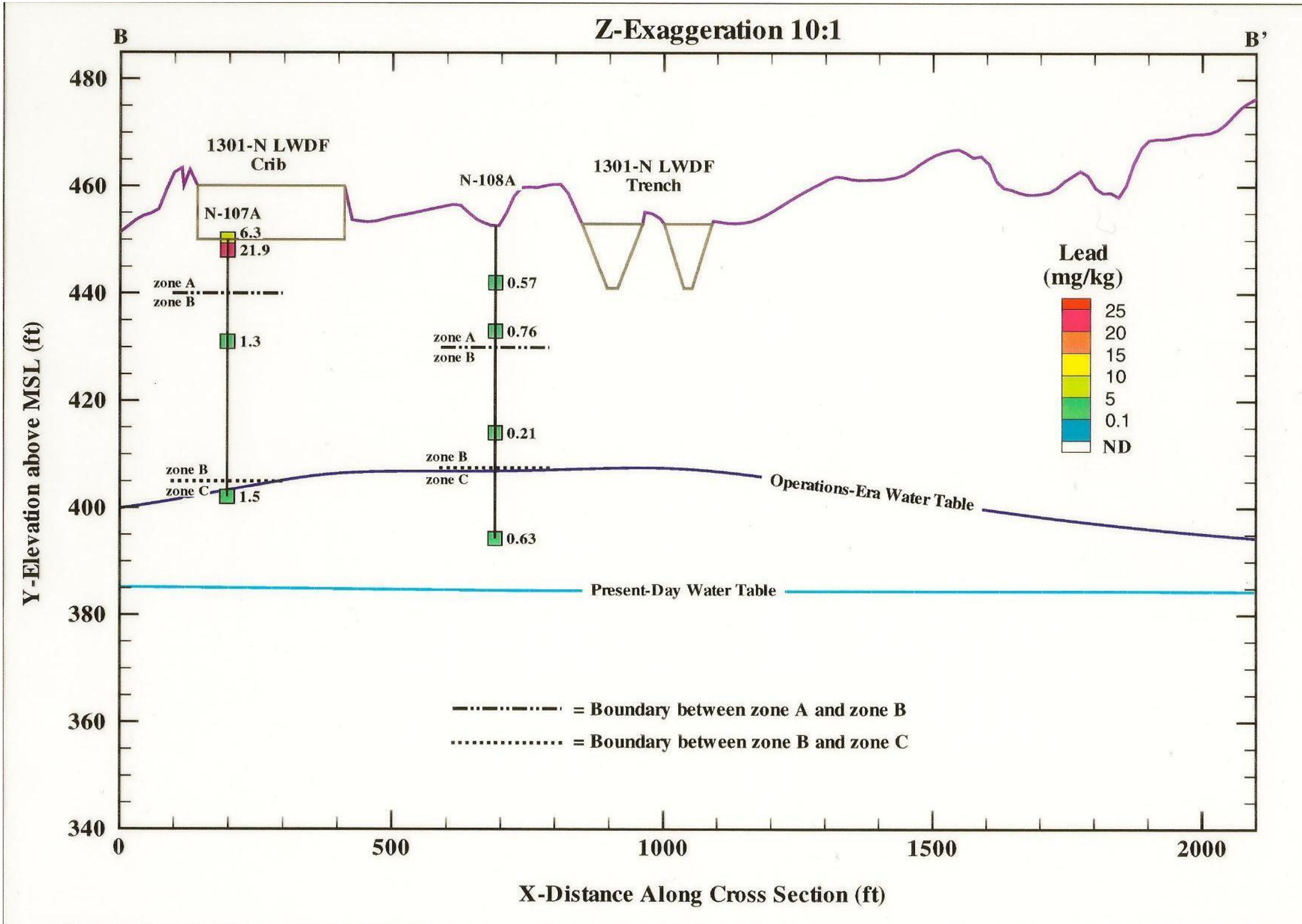

Z-Exaggeration 13.65:1
A
A'
Lead (mg/kg)
25
20
15
10
5
0.1
ND
1301-N LWDF Trench
N-108A
0.57
0.76
zone A
zone B
0.21
zone B
zone C
0.63
1325-N LWDF Crib
N-109A
2.7
1.9
zone A
1.7
zone B
1.7
1.2
zone B
zone C
3.2
High River Stage (393 ft above MSL)
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
X-Distance Along Cross Section (ft)
480
460
440
420
400
380
360
340
0
500
1000
1500
2000
2500



Z-Exaggeration 13.65:1
A
A'
Lead (mg/kg)
25
20
15
10
5
0.1
ND
1301-N LWDF Trench
N-108A
0.57
0.76
zone A
zone B
0.21
zone B
zone C
0.63
1325-N LWDF Crib
N-109A
2.7
1.9
zone A
1.7
zone B
1.7
1.2
zone B
zone C
3.2
High River Stage (393 ft above MSL)
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
480
460
440
420
400
380
360
340
0
500
1000
1500
2000
2500
X-Distance Along Cross Section (ft)



A
Z-Exaggeration 13.65:1
A'
Nickel (mg/kg)
25
20
15
10
5
0.1
ND
1301-N LWDF Trench
N-108A
13.1
9.8
zone A
zone B
14.5
zone B
zone C
12.5
1325-N LWDF Crib
N-109A
8.5
7.4
zone A
4.6
zone B
5.5
3.4
zone B
zone C
11.9
High River Stage (393 ft above MSL)
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
480
460
440
420
400
380
360
340
0
500
1000
1500
2000
2500
X-Distance Along Cross Section (ft)



Z-Exaggeration 10:1
B
B'
1301-N LWDF Crib
N-107A
6.3
21.9
zone A
zone B
1.3
zone B
zone C
1.5
N-108A
0.57
0.76
zone A
zone B
0.21
zone B
zone C
0.63
1301-N LWDF Trench
Lead (mg/kg)
25
20
15
10
5
0.1
ND
Operations-Era Water Table
Present-Day Water Table
= Boundary between zone A and zone B
= Boundary between zone B and zone C
Y-Elevation above MSL (ft)
X-Distance Along Cross Section (ft)
480
460
440
420
400
380
360
340
0
500
1000
1500
2000

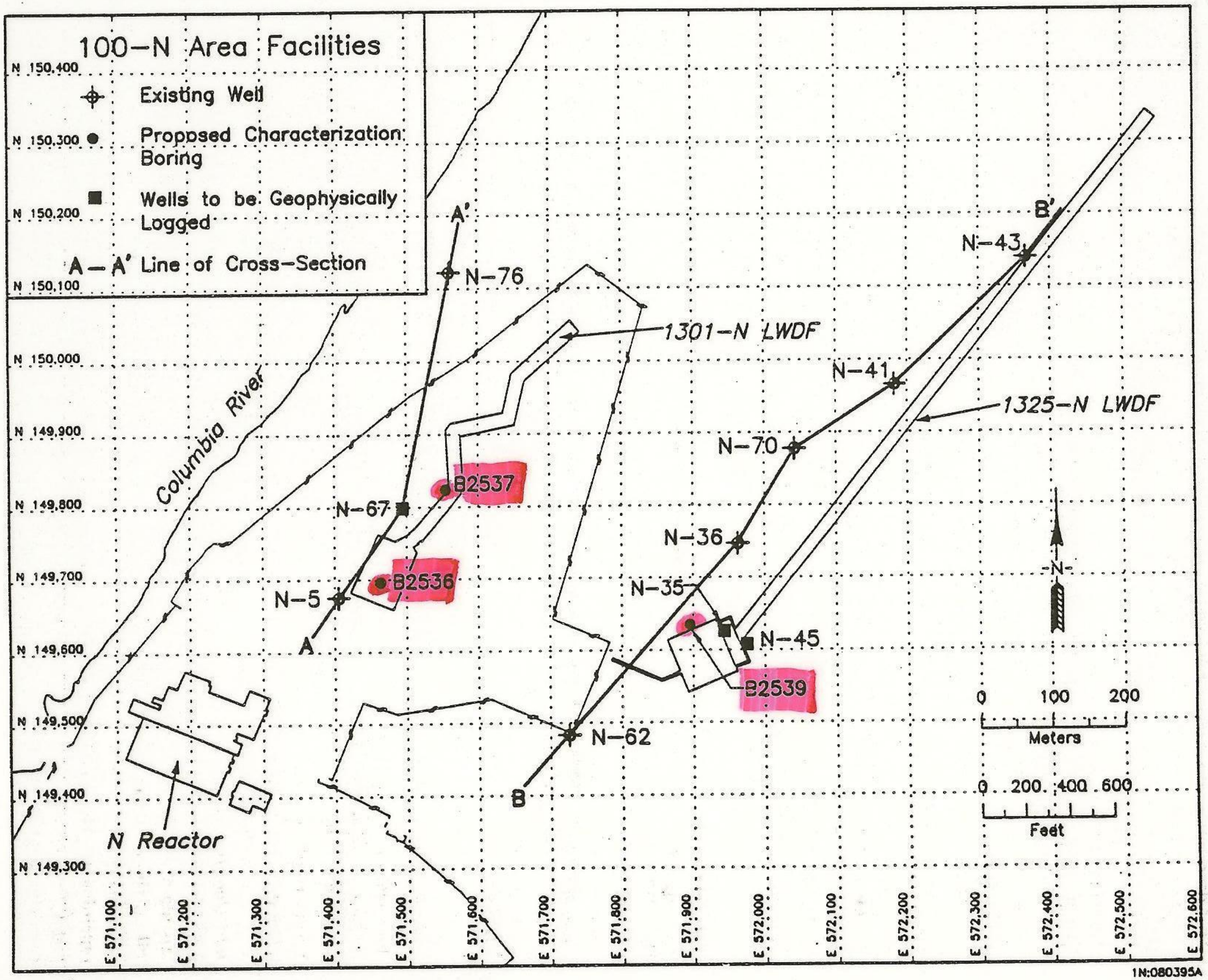
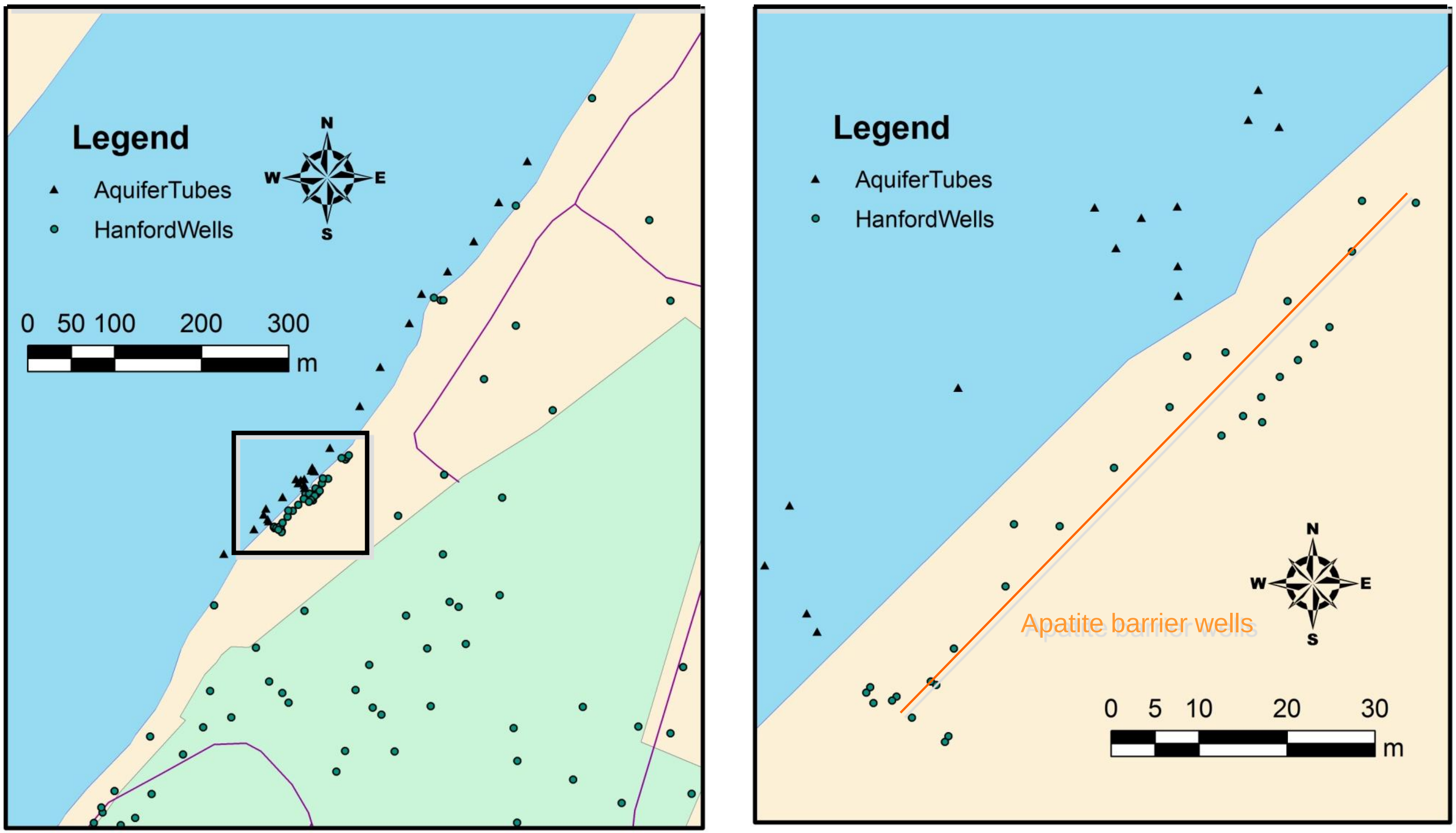


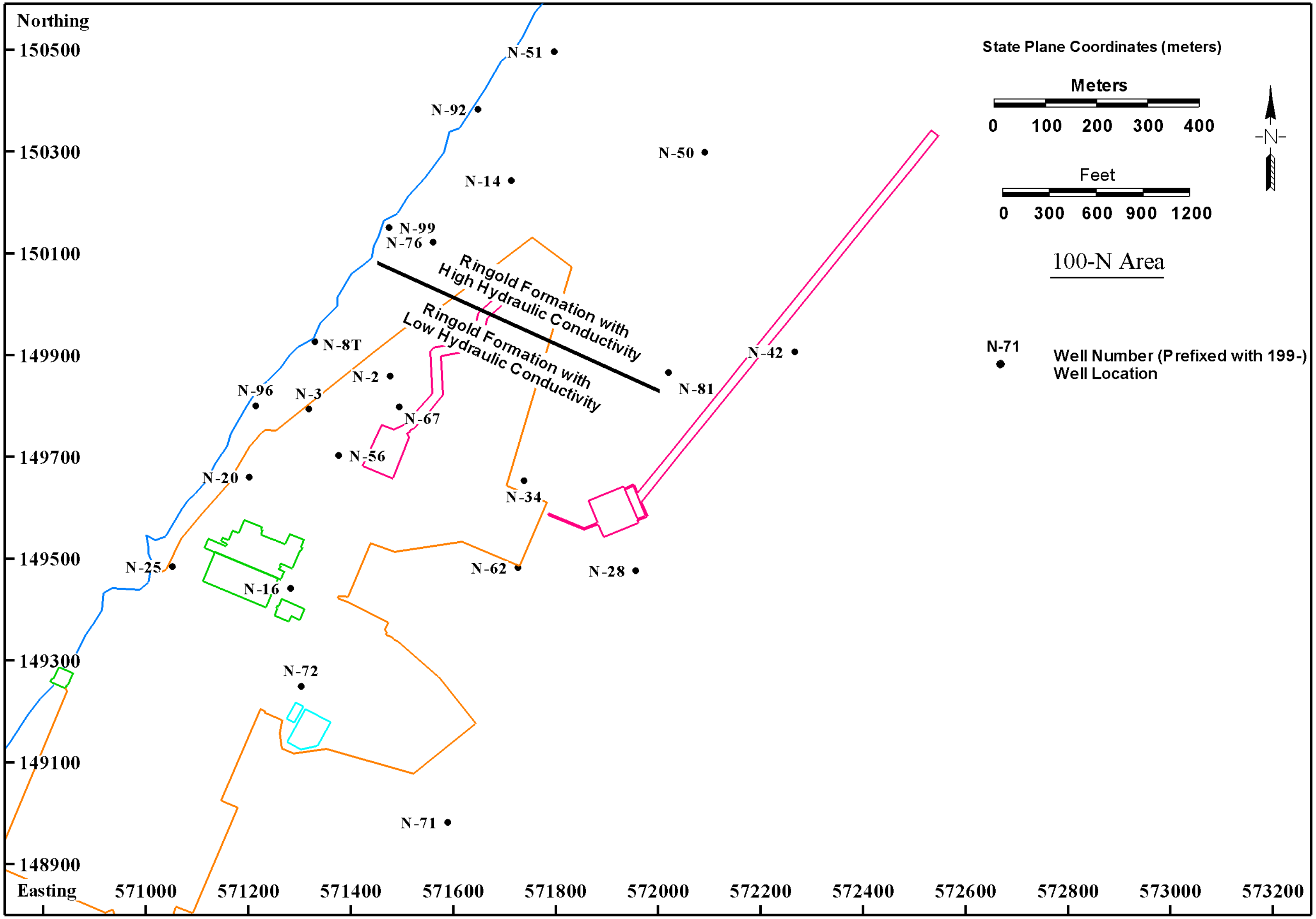
Figure 1. Locations of 1301-N and 1325-N Liquid Waste Disposal Facilities, Proposed Characterization Boreholes, and Existing Wells to be Geophysically Logged.

BACKUP SLIDES

Piezometers, Aquifer Tubes, and Monitoring Wells in the 100-N Area Study Location (2007)



Real Time Monitoring Network



Geochemistry of Stontium-90

The mobility of Sr-90 is determined by the ability of the different rock types to adsorb the Sr-90 available in the water. This is expressed by a simple ratio known as the bulk distribution coefficient also known as the K_d, which is the ratio of the mass on the solid phase per unit mass of solid phase divided by concentration in the water phase:

$$K_d = \frac{\text{mass of solute on solid phase per unit mass of solid phase}}{\text{concentration of solute in solution}}$$

The K_d for Strontium-90 has been measured in over 80 separate testes for the 100-N soils (Serne and Legore, 1996). For the coarse grained sediments of the Ringold Formation, found in this area, Serne recommends a bulk distribution coefficient of 15 ml/g

Geochemistry of Stontium-90, cont'd

Groundwater Velocity:

$$\upsilon_{\mathrm{w}} = \frac{-K * dh}{n * dl}$$

Sr-90 Velocity Relative to Groundwater Velocity

$$\frac{\upsilon_{\mathrm{w}}}{\upsilon_{\mathrm{Sr\text{-}90}}} = 1 + \frac{\rho_b}{n} * K_d = 1 + \frac{2.0 g / ml}{0.28} * 15 ml / g = 108$$

υ_w	=	Groundwater Pore Velocity
K	=	Hydraulic Conductivity
n	=	Porosity
dh	=	Change in Water Level
dl	=	Change in Distance over which Water Level Change Took Place
$\upsilon_{Sr\text{-}90}$	=	Sr-90 Velocity in Groundwater
ρ_b	=	Bulk Density
K_d	=	Bulk Distribution Coefficient

Historic Monitoring 100-N Well Network